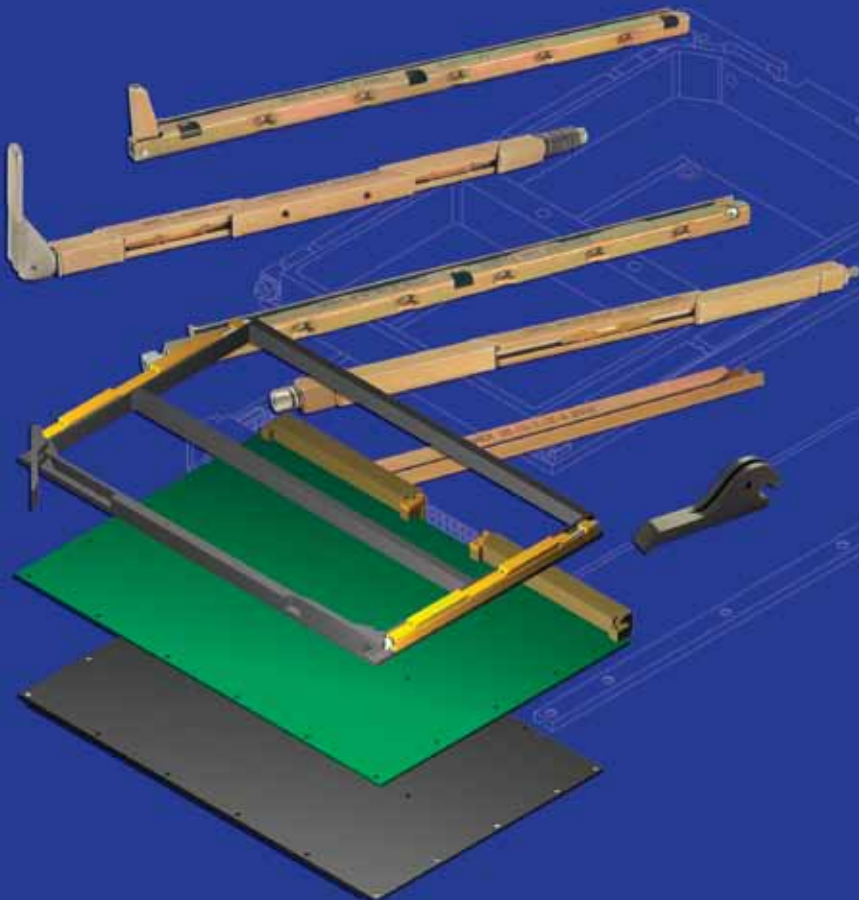


# Rugged Printed Circuit Board Hardware



**2010 Edition, Vol. 2**



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Series 42 Three-piece, 5.72 (.225) x 5.72 (.225)	24
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The Birtcher® brand, home of the original WEDGE-LOK®, also provides rugged printed circuit board card guides, conduction cooled frames for VME, CompactPCI®, PMC applications and extractors for use in non-benign airborne, ship-borne and rugged land transportation environments. In addition to our broad range of standard products, modifications can be made to meet customer-specific requirements.

Pentair Technical Products, a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. Its industry-leading brands—Hoffman®, Schroff®, McLean® Cooling Technology, Calmark®, Birtcher®, Aspen Motion Technologies™ and Taunus™—provide a broad variety of standard, modified and engineered solutions to the commercial, communications, energy, general electronics, industrial, infrastructure, medical, and security and defense markets.



## **Pentair** Technical Products

*Hoffman*®

*Schroff*®

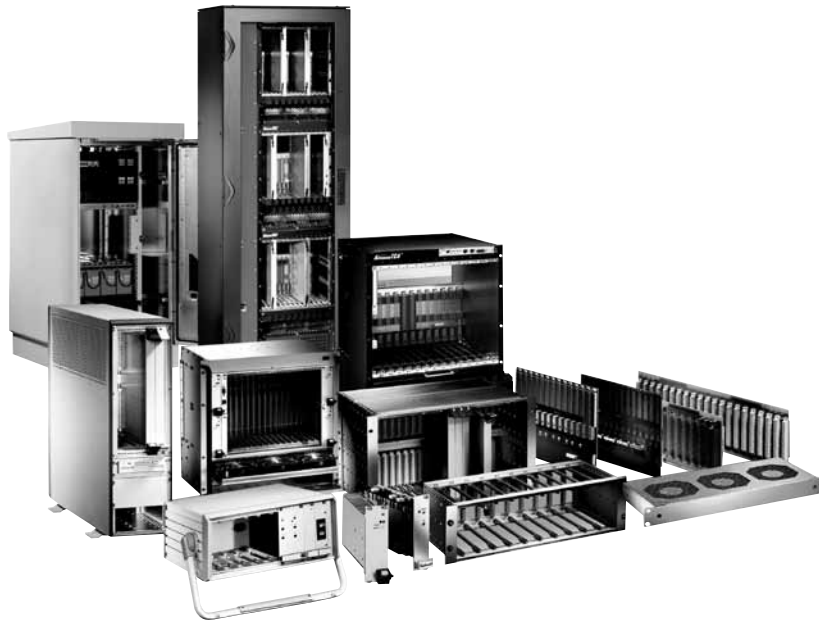
**McLean**  
COOLING TECHNOLOGY

**Taunus**

**CALMARK**®

**Birtcher**®

Aspen Motion Technologies



## GLOBAL CAPABILITIES

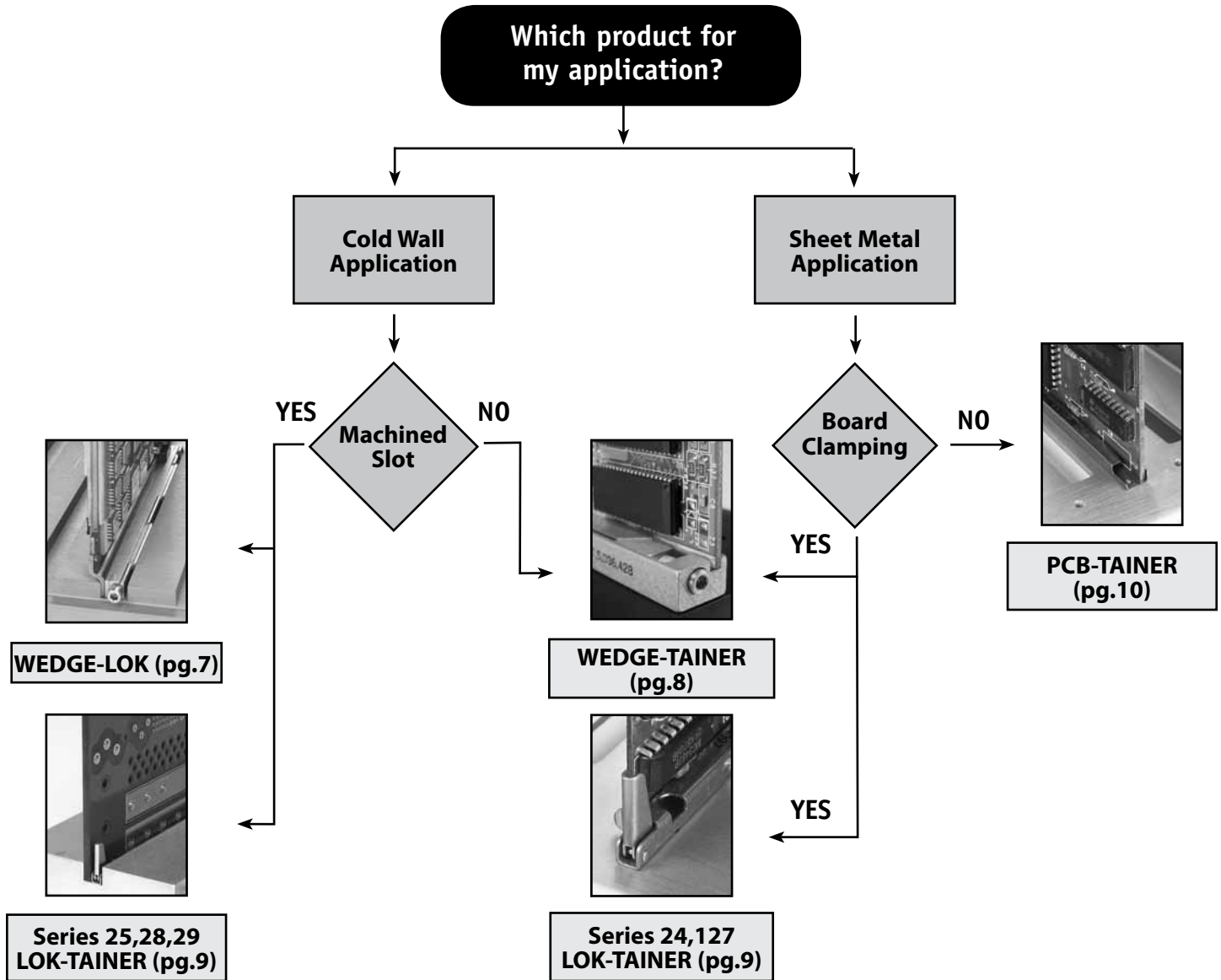
Fabrication Capabilities									
	Steel	Aluminum	Stainless Steel	Stamping	Chassis Assembly	Testing	Finishing	System Integration	Capacity
<b>AMERICAS</b>									
Anoka, MN USA	•	•	•		•	•	•	Level 1-4	720,000 sq. ft. (66,890 sq. m)
Mt. Sterling, KY USA	•		•				•	Level 1-2	310,000 sq. ft. (29,000 sq. m)
Warwick, RI USA	•	•	•		•	•	•	Level 1-5	170,000 sq. ft. (15,794 sq. m)
San Diego, CA USA		•		•	•	•		Level 1-5	60,000 sq. ft. (5,574 sq. m)
Reynosa, Mexico	•	•	•	•			•	Level 1-2	325,000 sq. ft. (30,193 sq. m)
Boituva, Brazil SA	•	•	•		•	•	•	Level 1-4	170,000 sq. ft. (15,794 sq. m)
<b>ASIA / NEAR EAST</b>									
Qingdao, China	•	•	•	•	•	•	•	Level 1-3	60,000 sq. ft. (5,574 sq. m)
Meiwa, Japan	•				•	•		Level 1-3	40,000 sq. ft. (3,716 sq. m)
Bangalore, India	•						•	Level 1-3	75,000 sq. ft. (6,968 sq. m)
<b>EUROPE</b>									
Straubenhardt, Germany	•	•	•	•	•	•	•	Level 1-3	577,000 sq. ft. (53,605 sq. m)
Dzierzoniow, Poland	•	•		•	•	•	•	Level 1-3	110,000 sq. ft. (10,219 sq. m)
Betschdorf, France	•	•	•		•	•	•	Level 1-3	205,000 sq. ft. (19,045 sq. m)

# BIRTCHE<sup>®</sup> PRODUCT SELECTION GUIDE

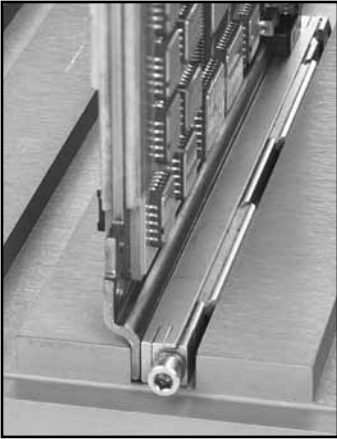
Birtcher<sup>®</sup> rugged card guides are available in four different product families:

- WEDGE-LOK<sup>®</sup>
- WEDGE-TAINER<sup>™</sup>
- LOK-TAINER<sup>®</sup>
- PCB-TAINER<sup>™</sup>

This product family selection chart will assist you in choosing the product family best suited for your application.



Once you have selected a product family, pages 7 through 10 will facilitate the selection of the correct product for your application based upon key performance criteria and product features.



The WEDGE-LOK® series of retainers offers the highest locking force available for cold wall applications. They mount to PC board assemblies using screws, rivets or adhesive bonding and are then inserted into machined channels of cold plates or heat exchangers. The wedge design holds the PC board firmly in place, providing high resistance to shock and vibration while producing maximum thermal transfer.



WEDGE-LOK

Product Series	3 or 5 Wedges	Actuation	Profile Width x Height in. (mm)	Length* Min to Max in. (mm)	Relative Clamping Force	Relative Retention Force	Relative Thermal Resistance	DSCC** Spec	DSCC CID	Relative Cost
<b>40</b> (pg. 16)	3 pc.	Screw	.225 x .260 (5.72 x 6.60)	2.00 to 12.00 (50.8 to 304.8)	☐	☐	☐	84103	59590	☐
<b>40-5</b> (pg. 18)	5 pc.	Screw	.225 x .260 (5.72 x 6.60)	5.00 to 12.00 (127.0 to 304.8)	☐	☐	☐	89064	59789	☐
<b>41</b> (pg. 20)	3 pc.	Screw	.240 x .180 (6.10 x 4.57)	2.00 to 12.00 (50.8 to 304.8)	☐	☐	☐	84103	--	☐
<b>42</b> (pg. 16)	3 pc.	Screw	.225 x .225 (5.72 x 5.72)	2.00 to 12.00 (50.8 to 304.8)	☐	☐	☐	84103	59590	☐
<b>42-5</b> (pg. 18)	5 pc.	Screw	.225 x .225 (5.72 x 5.72)	5.00 to 12.00 (127.0 to 304.8)	☐	☐	☐	89064	59789	☐
<b>44</b> (pg. 28)	3 pc.	Screw	.375 x .375 (9.53 x 9.53)	3.00 to 12.00 (76.2 to 304.8)	☐	☐	☐	--	--	☐
<b>44-5</b> (pg. 30)	5 pc.	Screw	.375 x .375 (9.53 x 9.53)	5.00 to 12.00 (127.0 to 304.8)	●	●	●	--	59789	☐
<b>45</b> (pg. 32)	3 pc.	Screw	.225 x .260 (5.72 x 6.60)	2.00 to 12.00 (50.8 to 304.8)	☐	☐	☐	--	--	☐
<b>146CR</b> (pg. 34)	3 pc.	Lever	.225 x .270 (5.72 x 6.90)	3.00 to 9.00 (76.2 to 228.6)	☐	☐	☐	--	--	☐
<b>146CR-5</b> (pg. 36)	5 pc.	Lever	.225 x .270 (5.72 x 6.90)	5.00 to 12.00 (127.0 to 304.8)	☐	☐	☐	--	--	☐
<b>48SL</b> (pg. 38)	5 pc.	Screw	.250 x .260 (6.35 x 6.60)	4.80 to 12.00 (121.9 to 304.8)	☐	☐	☐	--	--	☐
<b>48-5</b> (pg. 40)	5 pc.	Screw	.300 x .250 (7.62 x 6.35)	3.00 to 11.00 (76.2 to 279.4)	☐	☐	●	--	--	☐

\* for other lengths please consult factory

\*\* Defense Supply Center, Columbus

• Relative performance data is based upon a 6.00-in. (152.4-mm) length part with Chem Film finish

700-lb. (3114-N) Clamping Force



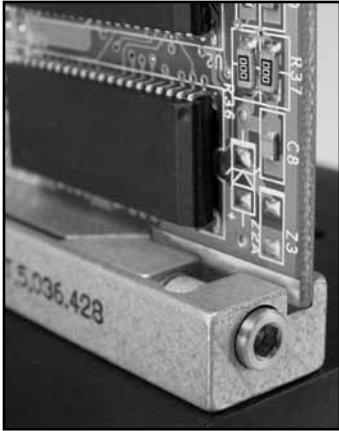
750-lb. (3336-N) Retention Force



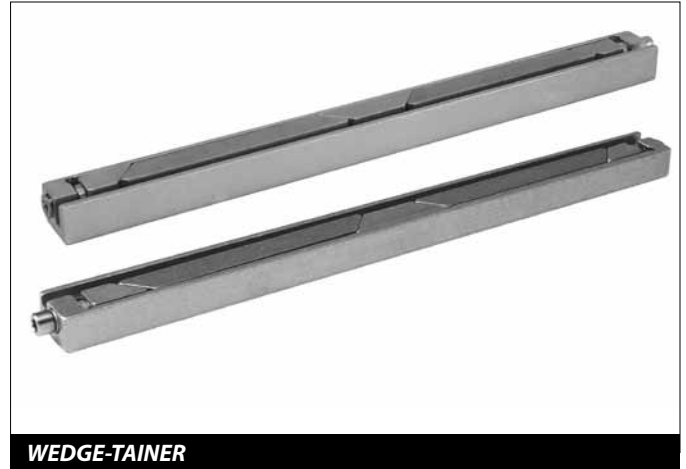
0.8 C/W/in. Thermal Resistance



# WEDGE-TAINER™



The WEDGE-TAINER™ series of locking retainers is designed for heavy shock and vibration, and for effective heat dissipation in sheet metal chassis/heat sink applications. The design combines chassis mounted housings with WEDGE-LOK® retainers.



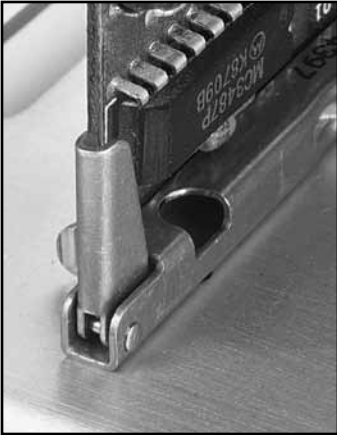
WEDGE-TAINER

Product Series	Actuation	Insertion Depth in. (mm)	Length* Min to Max in. (mm)	Relative Clamping Force	Relative Retention Force	Relative Thermal Resistance
<b>340</b> (pg. 42)	Screw	.230 (5.84)	3.00 to 5.50 (76.2 to 139.7) 3 pc. 6.00 -12.50 (152.4 to 317.5) 5 pc.			
<b>V340</b> (pg. 42)	Screw	.090 (2.29) (VME & cPCI)	3.00 to 5.50 (76.2 to 139.7) 3 pc. 6.00 -12.50 (152.4 to 317.5) 5 pc.			

\* for other lengths please consult factory

• Relative performance data is based upon a 6.00-in. (152.4-mm) length part with Chem Film finish

700-lb. (3114-N) Clamping Force 500-lb. (2224-N) Retention Force 0.8 C/W/in. Thermal Resistance



The LOK-TAINER® series of retainers are cam and lobe designs featuring lever or screw action for board retention. They are typically screw or rivet mounted to a sheet metal chassis, achieving a zero insertion force configuration as well as high resistance to shock and vibration. LOK-TAINERS also provide outstanding grounding characteristics.



LOK-TAINER

Product Series	Cold Wall Application	Actuation	Length* Min to Max in. (mm)	Relative Clamping Force	Relative Retention Force	Relative Thermal Resistance	DSCC** Spec	Relative Cost
<b>24</b> (pg. 44)	Yes	Lever	3.00 to 12.00 (76.2 to 304.8)			N/A	84168	
<b>25</b> (pg. 46)	Yes	Lever	3.00 to 12.00 (76.2 to 304.8)				86092	
<b>127</b> (pg. 48)	No	Screw	3.00 to 12.00 (76.2 to 304.8)			N/A	88052	
<b>28/29</b> (pg. 50)	Yes	Screw	3.00 to 12.00 (76.2 to 304.8)				--	

\* for other lengths please consult factory

\*\* Defense Supply Center, Columbus

• Relative performance data is based upon a 6.00-in. (152.4-mm) length part with Cadmium Yellow finish

70-lb. (311-N) Clamping Force



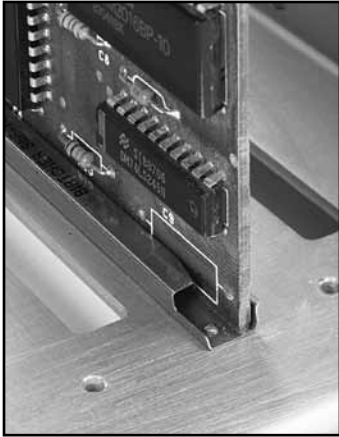
50-lb. (222-N) Retention Force



1.5 C/W/in. Thermal Resistance



# PCB-TAINER™



The PCB-TAINER™ series of retainers features a low-cost spring-action card retention design. They attach to the chassis using screws, rivets or adhesives and are designed primarily for use in sheet metal applications. The PCB-TAINER provides protection against shock and vibration and offers excellent grounding characteristics.



PCB-TAINER

Product Series		Board Thickness "A" in. (mm)	Height in. (mm)	Width in. (mm)	Length* Min to Max in. (mm)	Retention Force	DSCC** Spec	DSCC CID	Relative Cost
15 (pg. 52)*		.063 (1.59)	.190 (4.83)	.500 (12.7)	2.00 to 10.00 (50.8 to 254.0)		--	--	
21 (pg. 54)		.031 (.79)	.125 (3.18)	.190 (4.83)	1.00 to 6.00 (25.4 to 152.4)		--	--	
		.063 (1.59)	.125 (3.18)	.190 (4.83)					
		.094 (2.38)	.130 (3.30)	.200 (5.08)					
35-1 (pg. 56)		.031 (.79)	.180 (4.57)	.360 (9.14)	2.00 to 6.00 (50.8 to 152.4)		85020 85021	55563	
		.063 (1.59)	.180 (4.57)	.360 (9.14)					
		.094 (2.38)	.180 (4.57)	.400 (10.16)					
35-2 (pg. 58)		.031 (.79)	.130 (3.30)	.320 (8.13)	2.00 to 6.00 (50.8 to 152.4)		--	--	
		.063 (1.59)	.130 (3.30)	.320 (8.13)					
		.094 (2.38)	.130 (3.30)	.360 (9.14)					
35-5 & 35-6 (pg. 60)		.031 (.79)	.180 (4.57)	.130 (3.30)	35-5: 1.37 (34.79) only 35-6: 1.00 to 6.00 (25.4 to 152.4)		85020 85021	55563	
		.063 (1.59)	.180 (4.57)	.130 (3.30)					
		.094 (2.38)	.180 (4.57)	.370 (9.39)					
35-7 (pg. 62)		.031 (.79)	.125 (3.18)	.250 (6.35)	25.4 to 152.4 (1.00 to 6.00)		85020 85021	55563	
		.063 (1.59)	.125 (3.18)	.250 (6.35)					
		.094 (2.38)	.125 (3.18)	.250 (6.35)					
35-8 (pg. 64)*		.031 (.79)	.130 (3.30)	.320 (8.13)	50.8 to 152.4 (2.00 to 6.00)		--	--	
		.063 (1.59)	.130 (3.30)	.320 (8.13)					
		.094 (2.38)	.130 (3.30)	.360 (9.14)					
37-1 37-6 (pg. 66)		N/A	.180 (4.57)	N/A	25.4 to 152.4 (1.00 to 6.00)		--	--	

50-lb. (222-N) retention force

\* Relative performance data is based upon a 6.00-in. (152.4-mm) length part with Cadmium Yellow finish  
 \*\* Additional board thicknesses available. See individual product pages

## Finish & Plating

The Birtcher product line is available in a wide variety of standard finishes. Most of the components are made of aluminum, stainless steel, beryllium copper or plastic. The standard finishes are:

### For aluminum, standard finishes include:

- Chemical Film per Mil-C-5541 Class 1A or 3, Gold
- Chemical Film per Mil-DTL-5541 Class 3, Type II, Clear
- Black Anodize per Mil-A-8625 Type II, Class 2
- Hard Black Anodize per Mil-A-8625 Type III, Class 2
- Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

### For stainless steel, standard finish is:

- Passivation per Mil-S-5002

### For BeCu, standard finishes include:

- Tin Plate per Mil-T-10727 Type I, Bright
- Nickel Plate per QQ-N-290 Class I, Grade F
- Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright
- Zinc Plate per ASTM-B633 Type III (Clear), SC1

### For plastic card guides and extractors:

- Color coding is available for natural/white card guides and extractors
- Standard colors are BLK, BRN, RED, ORG, YEL, GRN, BLU, VIO and GRY

## RoHS - Restriction of Hazardous Substances

The Birtcher product line offers several product configurations to meet the requirements of the European Directive 2002/95/EC for Restriction of Hazardous Substances. This European Directive affects primarily the aluminum components that are finished with a gold chemical film process. This process uses a hexavalent chromium (Cr+6). A clear chemical film process using a trivalent chromium (Cr+3) option has been added for customers who need to meet this requirement. Contact our applications engineers for more details regarding the RoHS requirements of specific items.

## DFARS 252.225-7014 & Alt 1. Preference for Domestic Specialty Metals Clause

Birtcher products can support the needs of Prime Contractors and Subcontractors supplying product to the DOD, particularly the Preference for Domestic Specialty Metals Clause. This clause is applicable to DOD Prime Contract Awards exceeding the simplified acquisition threshold of products, components and assemblies for use in aircraft, missile and space systems, ships, tank and automotive items, weapon systems or ammunition.

For the Birtcher product line, this affects the hardware, components and materials that are made of stainless steel. At the time of this writing all COTS items, which include all part numbers configurable in this catalog, are exempt from the Preference for Domestic Specialty Metals Clause for Prime Contract Awards after October 25, 2007. Fastener DNAD waivers are also available for Prime Contract Awards between April 10, 2007 and July 26, 2008. There are many other exemptions available.

We recognize that our customers have different processes for handling this requirement, so we have implemented a process that we feel will accommodate the great majority of our customers' requirements. Because Class Deviations are not retro-active at this time, we do require that all quotations and purchase orders note this requirement along with the Prime Contract Number. We do charge for a signed DFARS 252.225-7014 & Alt 1. Statement Sheet that must accompany your order. For customers who can use the COTS exemption, we provide downloadable documents on our Web site. The product sheets will indicate from the Statement Sheet which statement applies to your product of interest. If these documents meet your needs, please indicate this in your quotation or P. O. Requests for a signed Statement Sheet can be accommodated for an additional fee.

## DSCC - Defense Supply Center - Columbus

Birtcher standard products meet many of the specifications defined by Defense Supply Center – Columbus. The DSCC part numbers are incorporated into our standard product offering. To obtain the proper specification requirements, add a "BR-" prefix to our DSCC part configuration number. The DSCC part number will be included in the description. All part numbers defined in the DSCC specifications are considered Birtcher COTS items.

## Design Flexibility – Common Modifications

The Birtcher product line offers an extremely broad range of configurations, not all of which are detailed in this catalog. Contact one of our applications engineers and a unique part number will be assigned for a product that meets your specification. Some of the available modifications include:

- 7 and 9 or more wedge segments
- Lengths
- Relocation or addition of mounting holes
- Tapped holes
- Screw head activation
- Specific individual wedge dimensions
- Replacement of split washers with Belleville washers
- Materials with different alloys
- Finish
- Lever lengths
- Hardware, including screw threads, thread-locking mechanism and bonded washers
- Secured wedges
- Modification of PCB-TAINERS™ and LOK-TAINERS™ to accommodate non-standard PCB thicknesses
- Plastic parts hot stamping
- Silkscreen or inkstamp

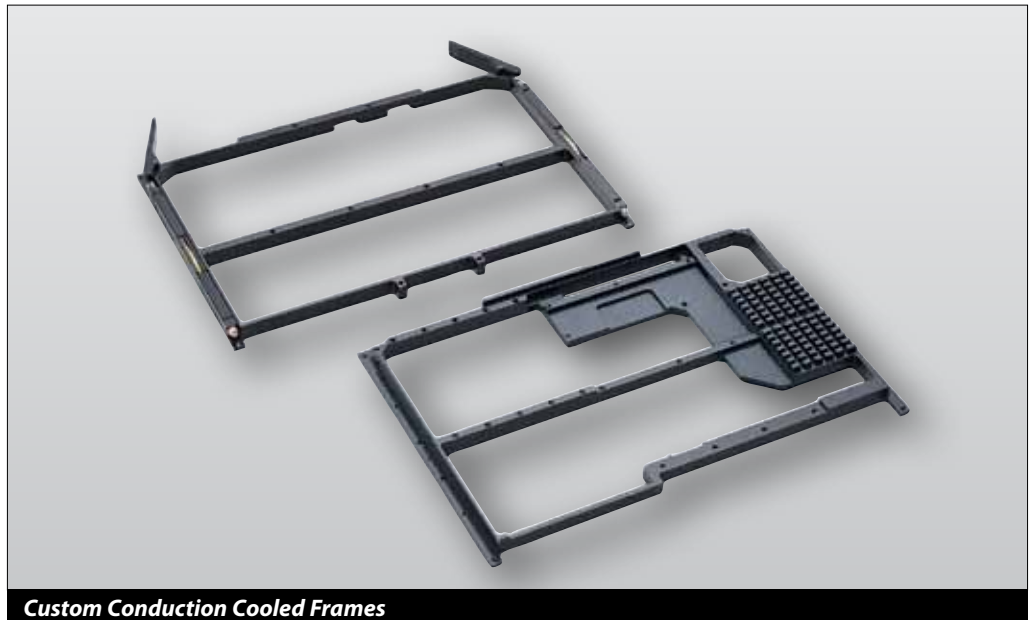
Our applications engineers can help you specify a cost-effective design for your application. This catalog offers the configurations that meet most applications, but if you don't see what you're looking for, please call us. Odds are, we've already created something very similar.

## Warranty

Pentair Technical Products' Warranty guarantees product from defects for 1 (one) year after shipment.

Conduction Cooled Assemblies consist of a conduction cooled frame, backing plate or backing strips, extractors and wedge clamps. They are designed for circuit boards requiring cooling in severe environments where convection cooling is not practical. The assembly also provides needed structural support of the plug-in module during extremely high shock and vibration applications. Optional configuration for compliance to IEEE 1101.2 and VITA 30.1.

Birtcher offers a standard design that takes the guesswork out of the perimeter of the assembly. The component area can be customized to match your board and application.



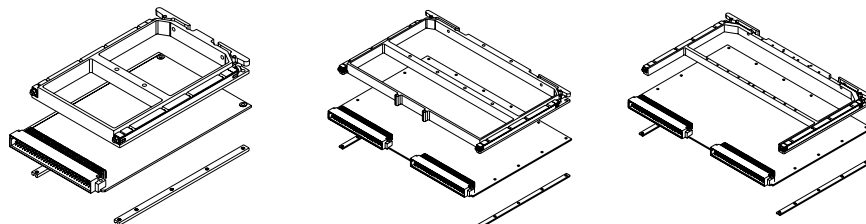
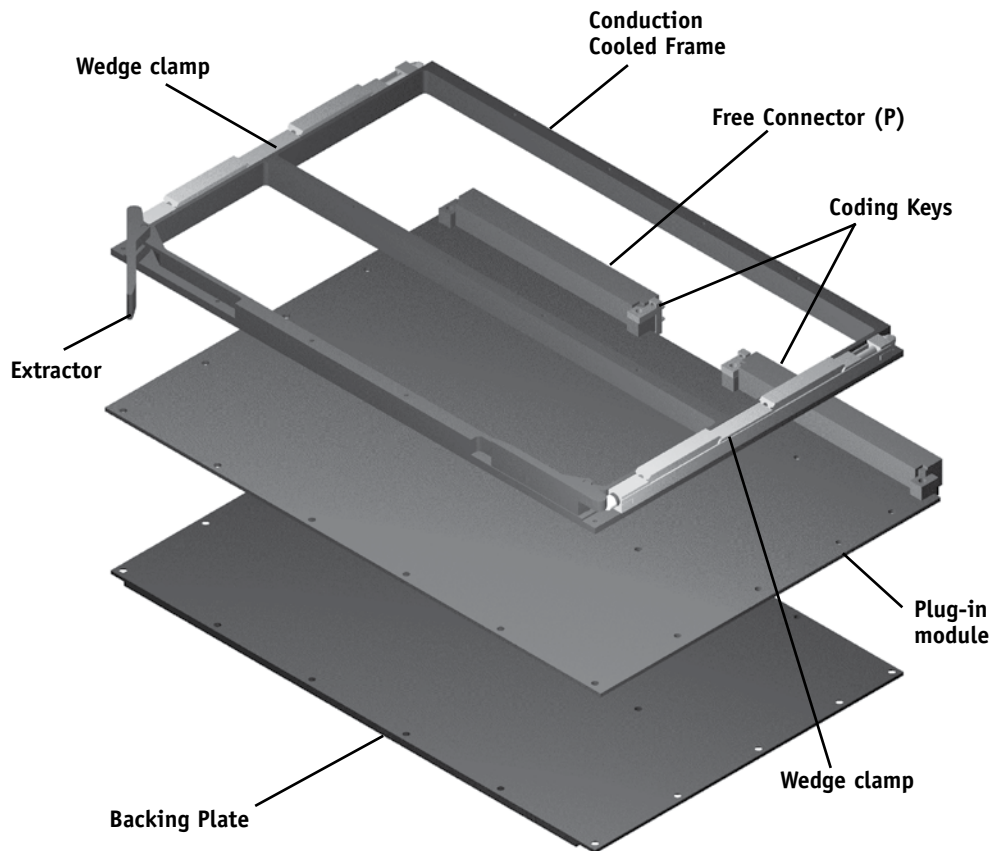
**Custom Conduction Cooled Frames**

## FEATURES

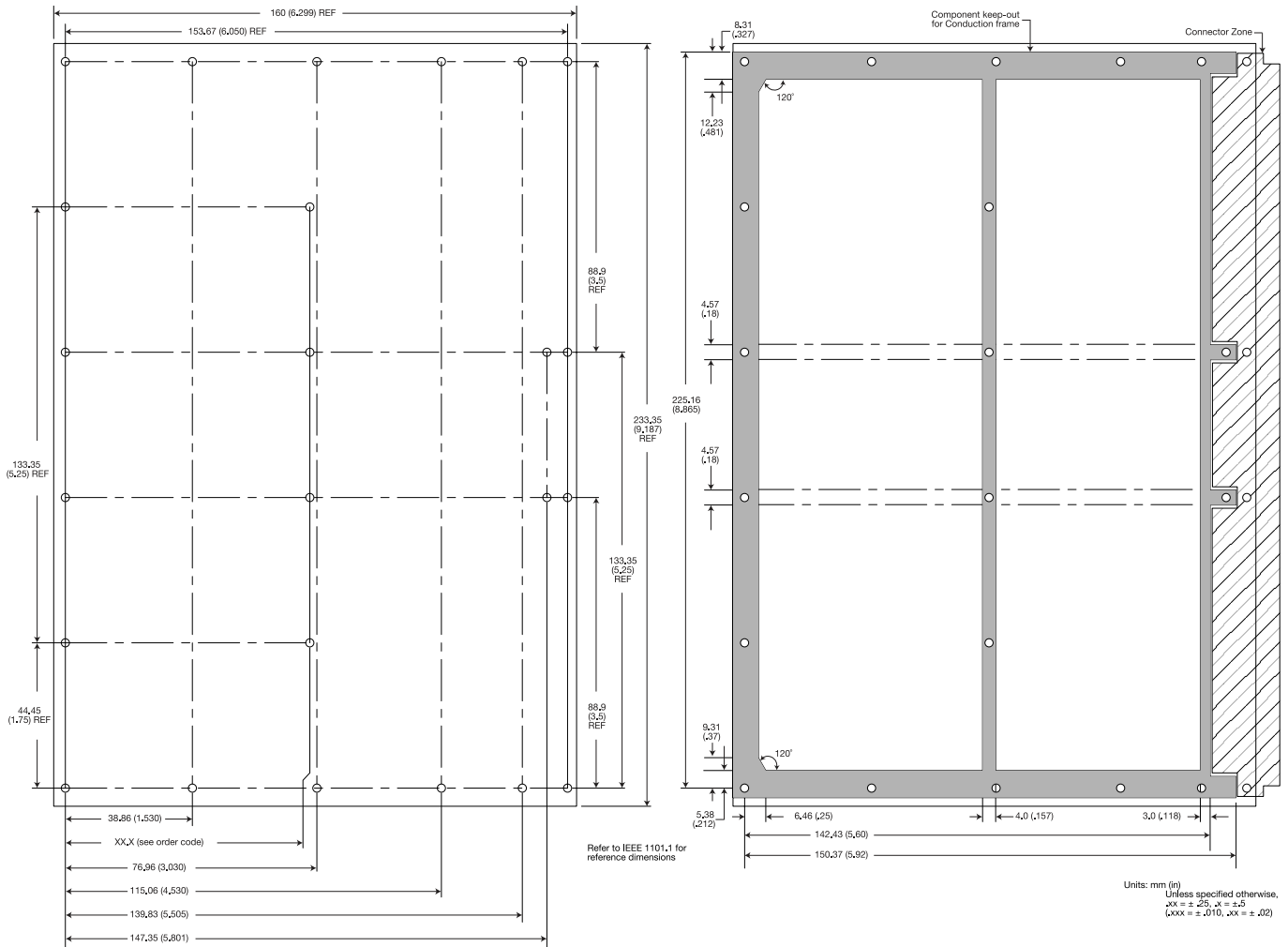
- Conduction frames available in 3U or 6U, VME/VME64x (IEEE 1101.2) or cPCI (VITA 30.1) based designs
- Can accommodate ccPMC (per VITA 20) or XMCs
- Extractors provide ample force to disengage board connectors
- Available in Black Anodize, Chem film or Electroless Nickel plating for excellent corrosion resistance
- 6061-T6 aluminum provides high thermal conductivity as well as lightweight support
- Locking Helicoils secure board fasteners in extreme vibration environments
- High-performance five-piece wedge clamp provides high clamping force with even pressure distribution for low thermal resistance
- Frame and backing plate are each machined from a solid piece to assure high heat transfer and structural integrity
- Custom silkscreen available

## ACCESSORY

- Code Keys prevents VME64x Conduction Cooled Assemblies from inadvertent insertion into the wrong slot



- 3U and 6U designs are available with compliance to IEEE 1101.2 and VITA 30.1 specifications.
- Conduction Cooled PMC modules can be incorporated per VITA 20.



Part Number Code	
<b>Conduction Cooled Assemblies</b>	
3U _____	CC 3 V XXX G B16 L
6U _____	6
VME (1101.2) _____	V
cPCI (VITA 30.1) _____	C
Center rib location (mm.m) _____	XXX
PMC for ccPMC mounting _____	PMC
Gold Chemical Film Finish _____	G
or choose from Finish Table _____	1
Backing Thermal strip 1.6 mm (for V option) _____	B16
Backing Thermal strip 2.4 mm (for C option) _____	B24
Backing Plate 1.6 mm (for V option) _____	P16
Backing Plate 2.4 mm (for C option) _____	P24
Latching Extractor handle _____	L
no latching _____	[blank]

**Part Number Code example: CC3VPMCBP16L**

Conduction Cooled Assembly 3U IEEE 1101.2 designed with ccPMC (VITA 20) mounting, black anodized, with 1.6-mm backing plate and latching extractors

**1 FINISH TABLE**

Code Letter	Finish
"G"	Gold Chemical Film per Mil-C-5541 Class 1A
"C"	Clear Chemical Film per Mil-DTL-5541 Class 3, Type II
"B"	Black Anodize per Mil-A-8625 Type II, Class 2
"N"	Electroless Nickel per Mil-C-26074 Class 4, Grade B, Bright

**Birtcher has the answer for those IEEE 1101.10 applications with keying requirements, but do not have front panels.**

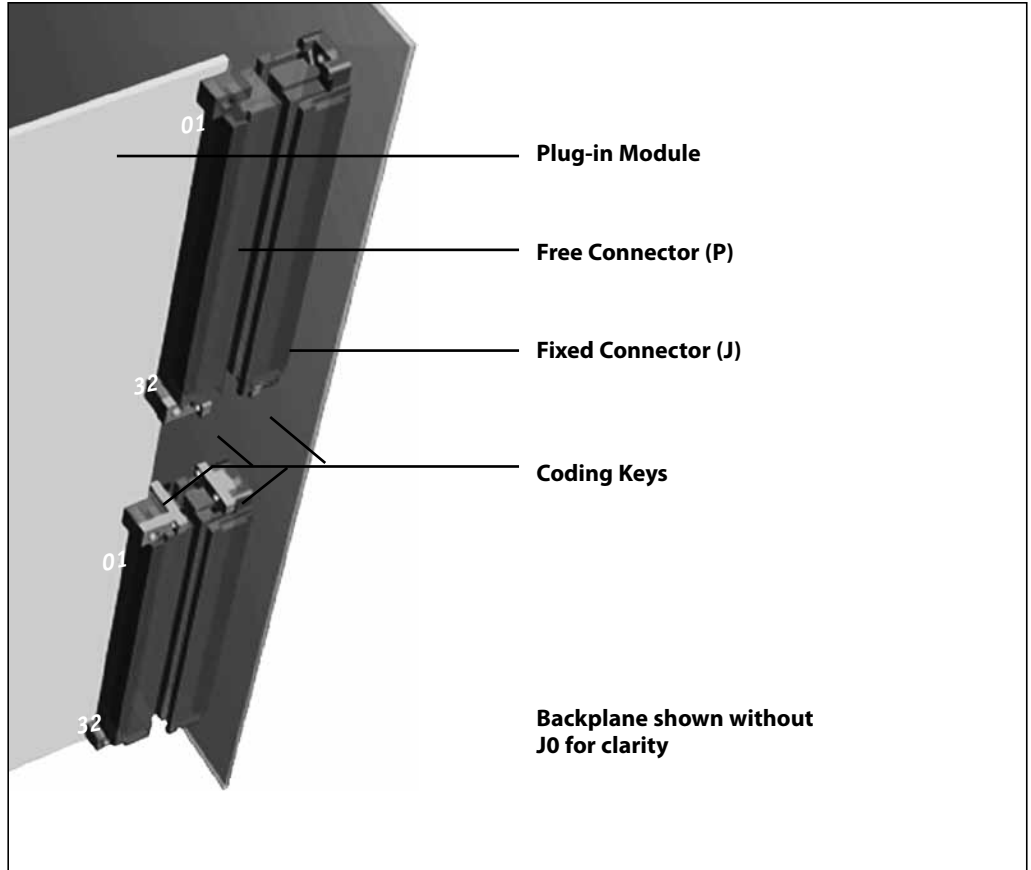
IEEE 1101.10 specifications provides a method for keying slots using programming keys inserted into the front panel assembly and card guide. Unfortunately, many military and ruggedized systems do not use this front panel system. VITA 1.6 standard provides a method of keying for these types of systems.

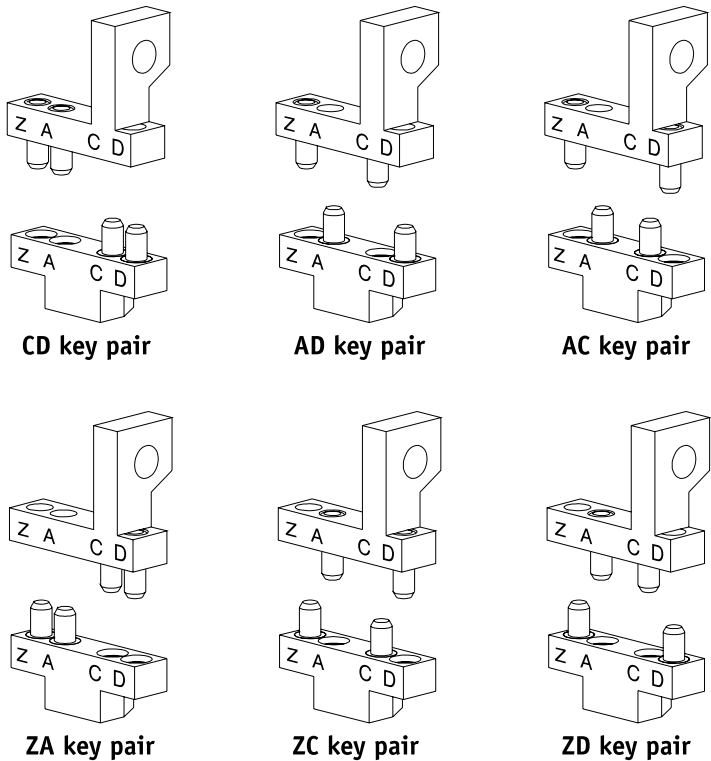
### FEATURES

- Complies with VITA 1.6 standard
- Gold Chem Film aluminum bracket
- 6 configurations per coding bracket set
- 36 configurations in a 6U conduction cooled application
- Up to 1296 Keying combinations in a 6U non-conduction cooled application
- Includes complimentary mounting hardware

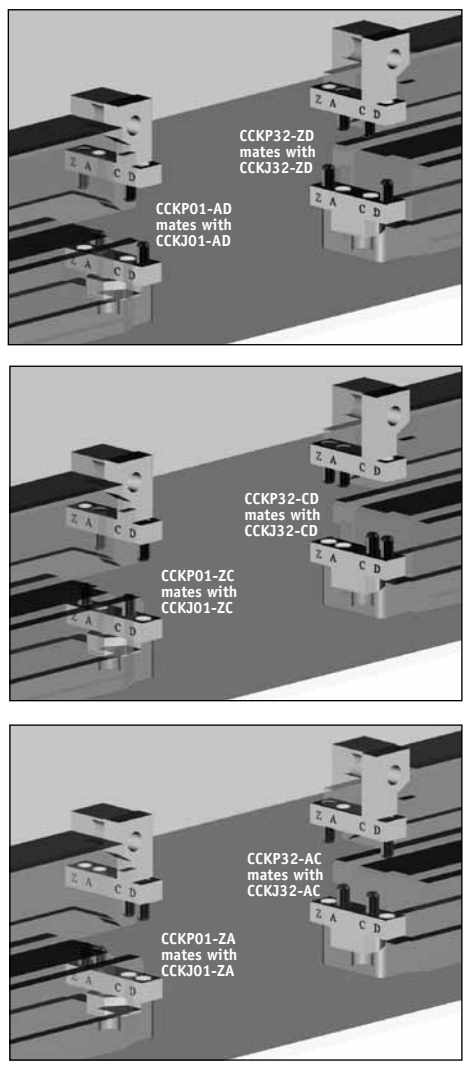
### WEIGHT

- 100 pcs. = 0.32 lb. (145 g)





For interface dimensions, refer to ANSI/VITA 1.6  
 \*The drawings above are representative of the J32 and P32. J01 and P01 are mirror images.



Samples of coding device usage - notations on brackets are for reference only

### Part Number Code

**Conduction Cooled Keying**      CCK       -    -X -X

**Board or Backplane**  
 Free Connector: \_\_\_\_\_    P  
 Fixed Connector: \_\_\_\_\_    J

**Connector End**  
 01 \_\_\_\_\_    01  
 32 \_\_\_\_\_    32

**Keying Configuration**

ZA _____	<u>  </u> <u>ZA</u>
ZC _____	<u>  </u> <u>ZC</u>
ZD _____	<u>  </u> <u>ZD</u>
AC _____	<u>  </u> <u>AC</u>
AD _____	<u>  </u> <u>AD</u>
CD _____	<u>  </u> <u>CD</u>

**Thread Type**  
 Metric 2.5-mm x .45 thread: \_\_\_\_\_    [Blank]  
 Imperial 2-56 thread: \_\_\_\_\_    1  
 Imperial 2-56 locking helicoil: \_\_\_\_\_    2  
 Metric 2.5-mm x .45 locking helicoil: \_\_\_\_\_    3

**Finish Type**  
 Chem Film Gold \_\_\_\_\_    [Blank]  
 Chem Film Clear \_\_\_\_\_    CC

### Also available in Kit Form (see contents example, below)

**Keying Configuration**

ZA _____	<u>  </u> <u>ZA</u>
ZC _____	<u>  </u> <u>ZC</u>
ZD _____	<u>  </u> <u>ZD</u>
AC _____	<u>  </u> <u>AC</u>
AD _____	<u>  </u> <u>AD</u>
CD _____	<u>  </u> <u>CD</u>

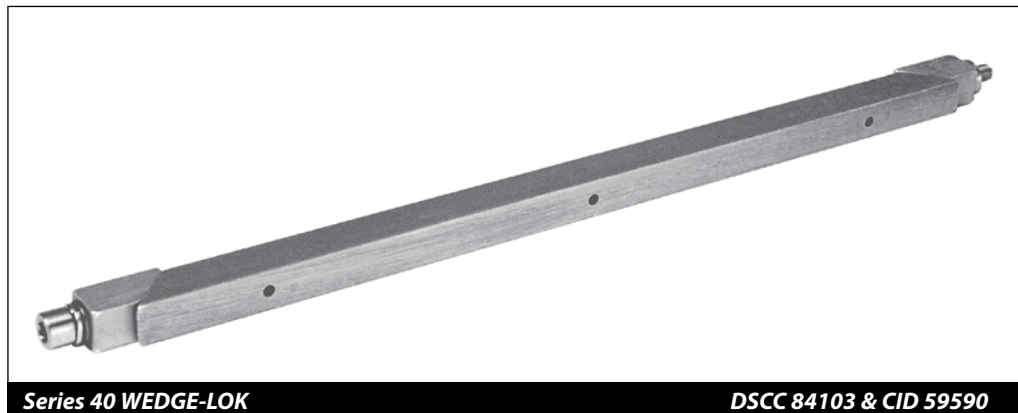
**Thread Type**  
 Metric 2.5-mm x .45 thread: \_\_\_\_\_    [blank]  
 Imperial 2-56 thread: \_\_\_\_\_    -1  
 Imperial 2-56 thread helicoil: \_\_\_\_\_    -2  
 Metric 2.5-mm x .45 locking helicoil: \_\_\_\_\_    -3

**Example of Kit Contents:**  
**CCK-KIT-ZA**

Qty	Item
1	CCKP01-ZA
1	CCKJ01-ZA
1	CCKP32-ZA
1	CCKJ32-ZA
4	Mounting Screws (complimentary)
4	Washers

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



Series 40 WEDGE-LOK

DSCC 84103 & CID 59590

## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

## SCREW

.09-in. or 2.5-mm hex. socket-head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## OPTION

### LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

Type A286 stainless steel per ASTM AMS 5525 (or similar)

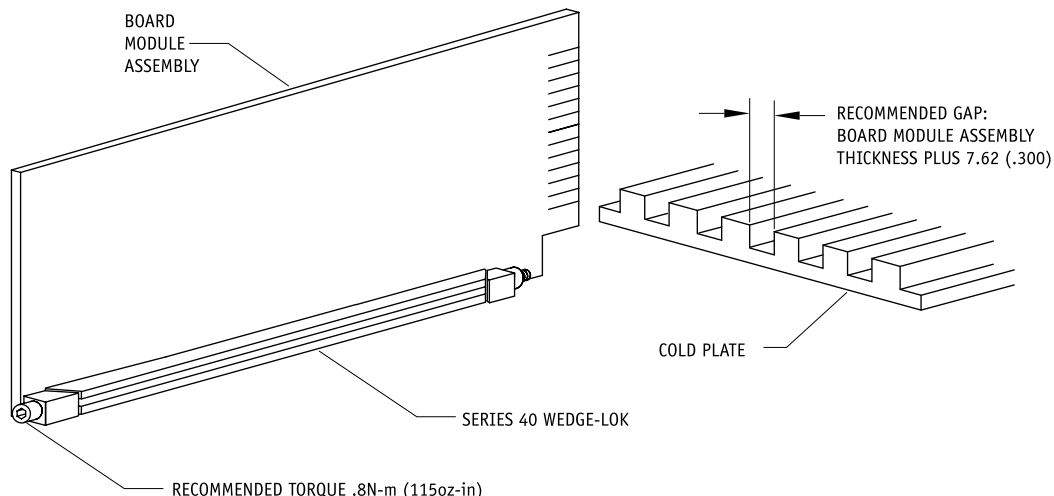
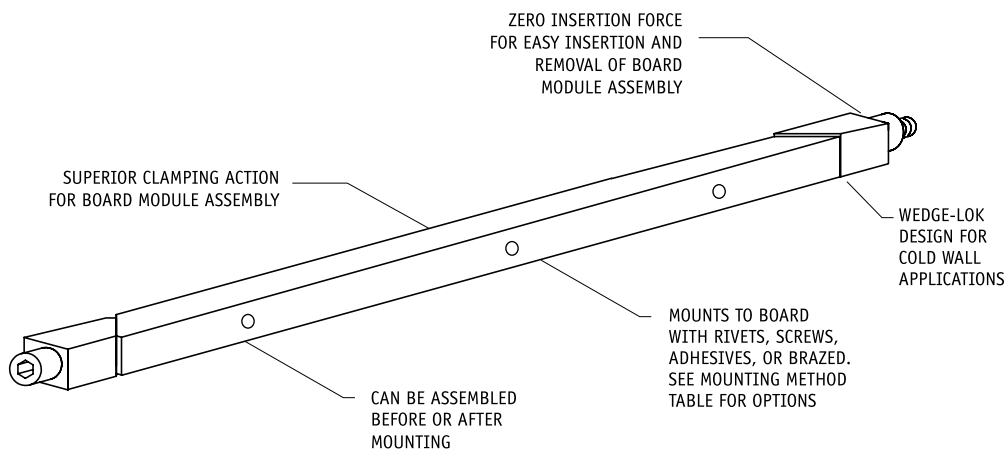
### Finish:

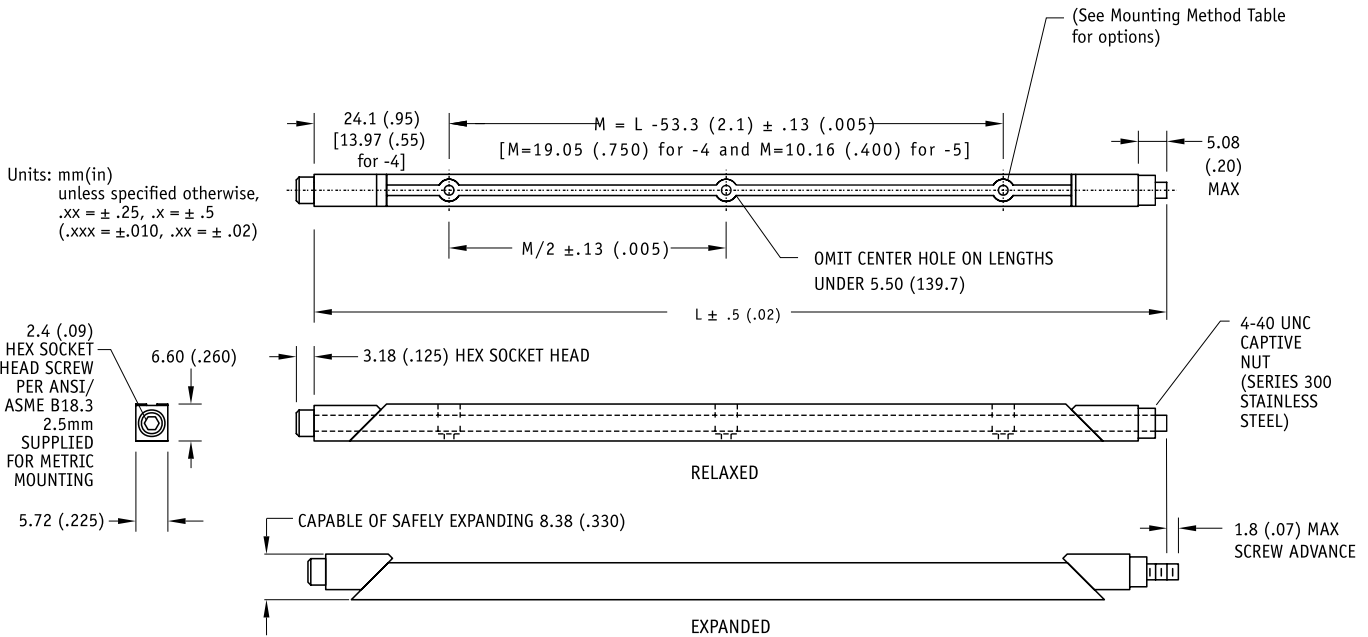
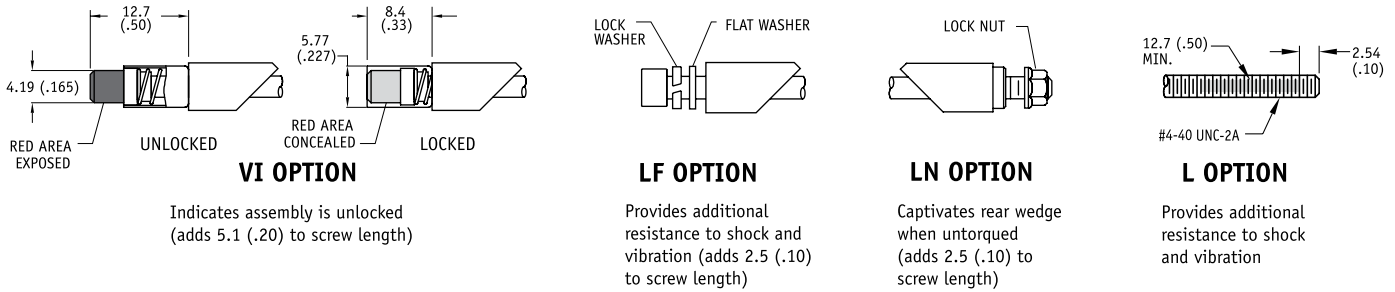
Silver plate per AMS 2410

## WEIGHT

.096 oz./in. (1.07 g/cm)

**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION**  
5.72 (.225) X 6.60 (.260) PROFILE





**Part Number Code** (See example at right)

**Series 40 WEDGE-LOK Three-piece**    40    x    -x    -x    -x    -x    -x

**Optional Visual Indicator**

Visual Indicator \_\_\_\_\_ **VI**

None \_\_\_\_\_ **[Blank]**

**Length**

Length in .500 (12.7) increments \_\_\_\_ 4 [2.00 (50.8)]

\_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**

Chem Film \_\_\_\_\_ **[Blank]**

or select code letter from Finish Table \_\_\_\_\_ 1

**Lock/Flat Washers and Locknut**

Lock Washer and Flat Washer \_\_\_\_\_ **LF**

None \_\_\_\_\_ **[Blank]**

Lock Nut \_\_\_\_\_ **LN**

None \_\_\_\_\_ **[Blank]**

**Mounting**

Standard Rivet Holes \_\_\_\_\_ **[Blank]**

or select code letter from Mounting Method Table \_\_\_\_\_ 2

**Lock Patch**

Lock Patch \_\_\_\_\_ **L**

None \_\_\_\_\_ **[Blank]**

**Part Number Code example: 40VI-12-LF**

Series 40 WEDGE-LOK Three-piece, 6.00 (152.4) long, with Visual Indicator option, Chem Film finish, standard rivet hole mounting, and Lock and Flat Washer option.

**1 FINISH TABLE**

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

**2 MOUNTING METHOD TABLE**

Code Letter	Method
NONE	Rivet Mount (Ø 1.70 +.10/-.03 (.067 +.004/-.001) THRU L Ø 3.96 (.156) ± 3.30 (.200) √ Ø 3.56 (.140) x 100°)
A	No mounting holes
S	2-56 UNC-2B tapped hole
T	0-80 UNF-2B tapped hole
M2	M2 x .40 tapped hole
M	M2.5 x .45 tapped hole
P	Indexing Pins Ø.062 x .040" (two pins only)

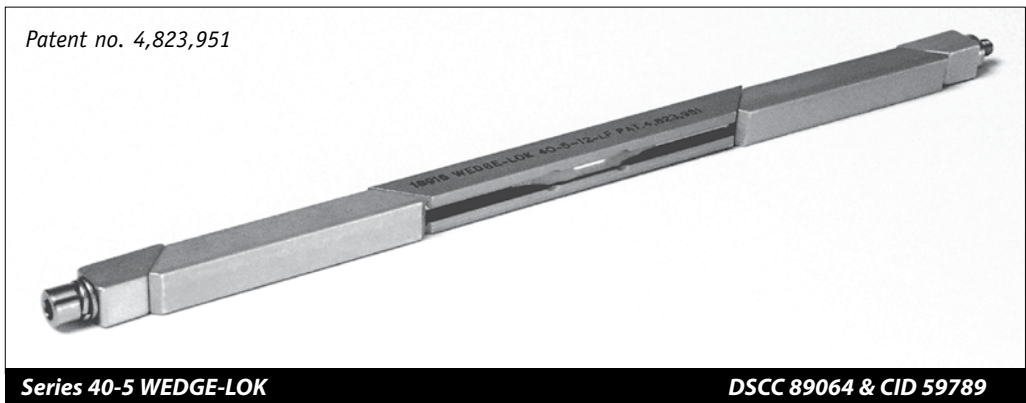
Indexing pins (-P) and rivet (blank) parts are shipped unassembled. Center wedge is unplated and unmarked for Indexing pins (-P) method.

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	

\*For mechanical and thermal performance data see the Technical Applications section pages 74-92



## WEDGES

### Material:

Aluminum Alloy 6061-T6 per QQ-A-200/8

### Finish:

See Finish table on opposite page

## SCREW

.09-in. or 2.5-mm. socket head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## ALIGNMENT SPRINGS

### Material:

Beryllium Copper QQ-C-533

### Finish:

Nickel QQ-N-290 Class I, Grade G, Bright

## OPTION

### LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

Type A286 stainless steel per ASTM AMS 5525 (or similar)

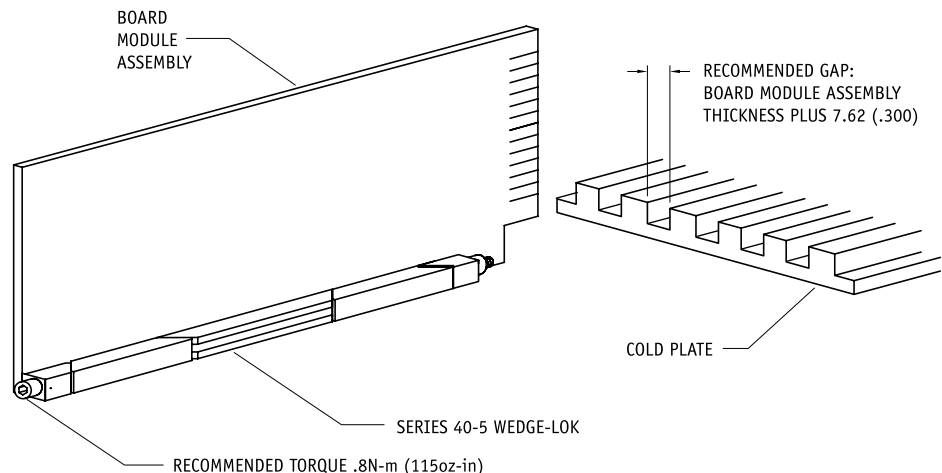
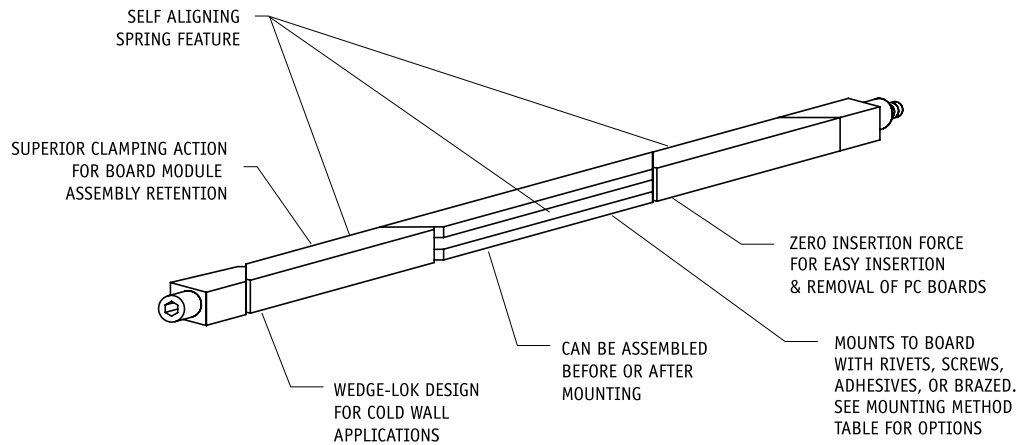
### Finish:

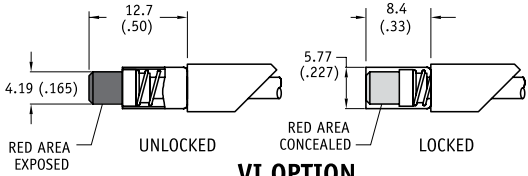
Silver plate per AMS 2410

## WEIGHT

1.04 oz./in. (1.16 g/cm)

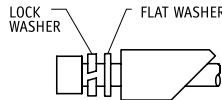
**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION**  
5.72 (.225) X 6.60 (.260) PROFILE





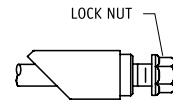
### VI OPTION

Indicates assembly is unlocked (adds 5.1 (.20) to screw length)



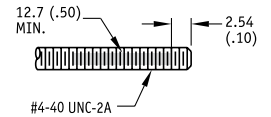
### LF OPTION

Provides additional resistance to shock and vibration (adds 2.5 (.10) to screw length)



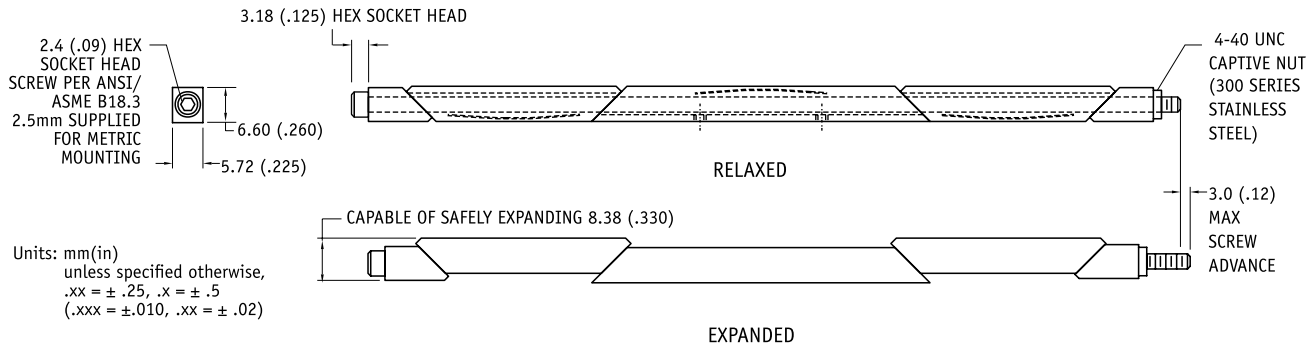
### LN OPTION

Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



### L OPTION

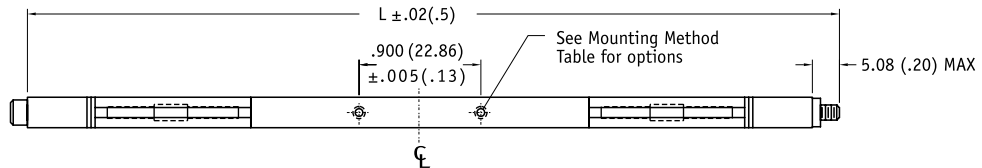
Provides additional resistance to shock and vibration



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

### MOUNTING HOLE LOCATION

22.86 (.900) hole spacing centered on mounting body  
-10 thru -13 2 holes  
-14 thru -24 4 holes



### Part Number Code (See example below)

Series 40-5 WEDGE-LOK Five-piece 40-5 x -x -x -x -x -x -x

#### Optional Visual Indicator

Visual Indicator \_\_\_\_\_ VI  
None \_\_\_\_\_ [Blank]

#### Length

Length in .500 (12.7) increments \_10 [5.00 (127.0)]  
\_\_\_\_\_ to 24 [12.00 (304.8)]

#### Finish

Chem Film \_\_\_\_\_ [Blank]  
or select code letter from Finish Table \_\_\_\_\_ 1

#### Lock/Flat Washers and Locknut

Lock Washer and Flat Washer \_\_\_\_\_ LF  
None \_\_\_\_\_ [Blank]

Lock Nut \_\_\_\_\_ LN  
None \_\_\_\_\_ [Blank]

#### Mounting

Standard 2-56 thread \_\_\_\_\_ [Blank]  
or select code letter from Mounting Method Table \_\_\_\_\_ 2

#### Lock Patch

Lock Patch \_\_\_\_\_ L  
None \_\_\_\_\_ [Blank]

### Part Number Code example: 40-5-20-LF-LN-M

Series 40-5 WEDGE-LOK Five-piece, 10.00-in. (254.0-mm) long, chem film finish, with Lock Washer and Flat Washer option and Lock Nut option, Screw M2.5 x .45 metric mounting.

### 1 FINISH TABLE

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
A	No Mounting Holes
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

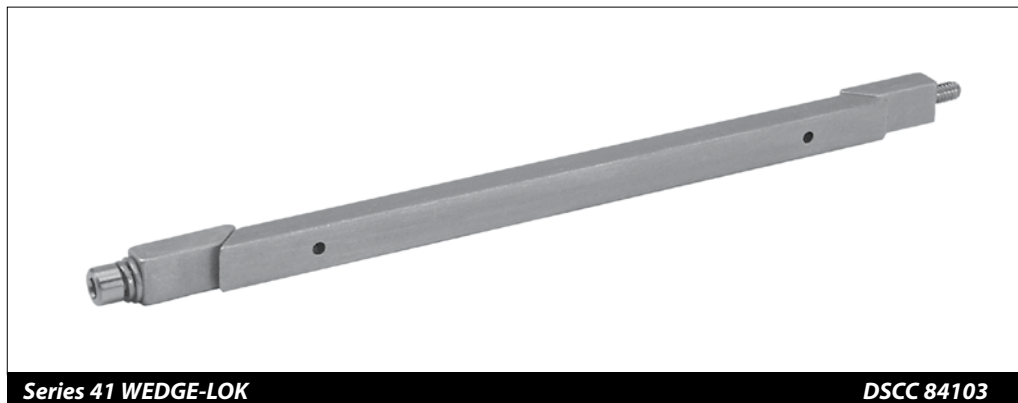
Code Letter	Method
NONE	2-56 UNC-2B tapped hole
R	Rivet Mount (Ø 1.70 +.10/-03 (.067 +.004/.001) THRU ⊥ Ø 3.96 (.156) ∇ 3.30 (.200) √ Ø 3.56 (.140) x 100°)
A	No Mounting Holes
T	0-80 UNF-2B tapped hole
M2	M2 x .40 tapped hole
M	M2.5 x .45 tapped hole
P	Indexing Pins Ø.062 x .040" (two pins only)

Indexing pins (-P) and rivet (-R) parts are shipped in un-snapped configuration. Center wedge is unplated and unmarked for Indexing pins (-P) method.

**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



Series 41 WEDGE-LOK

DSCC 84103

## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on  
opposite page

## SCREW

.09-in. or 2.5-mm hex. socket  
head cap screw, depending  
on mounting configuration

### Material:

Series 300 stainless steel per  
QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## OPTION LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per  
QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

Type A286 stainless steel per  
ASTM AMS 5525 (or similar)

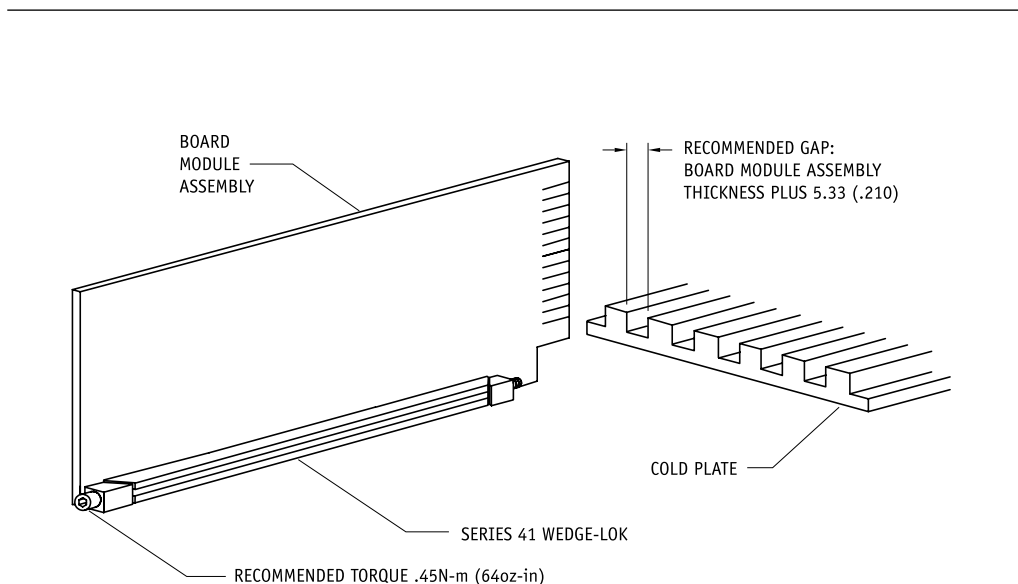
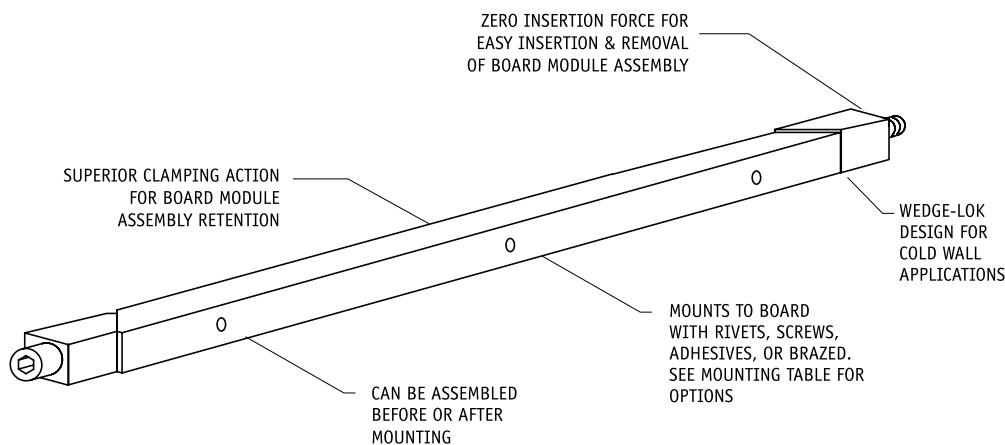
### Finish:

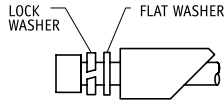
Silver plate per AMS 2410

## WEIGHT

.083 oz./in. (.93 g/cm)

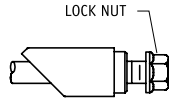
**DESIGNED FOR HEAVY SHOCK,  
VIBRATION & HEAT DISSIPATION**  
6.10 (.240) X 4.57 (.180) PROFILE





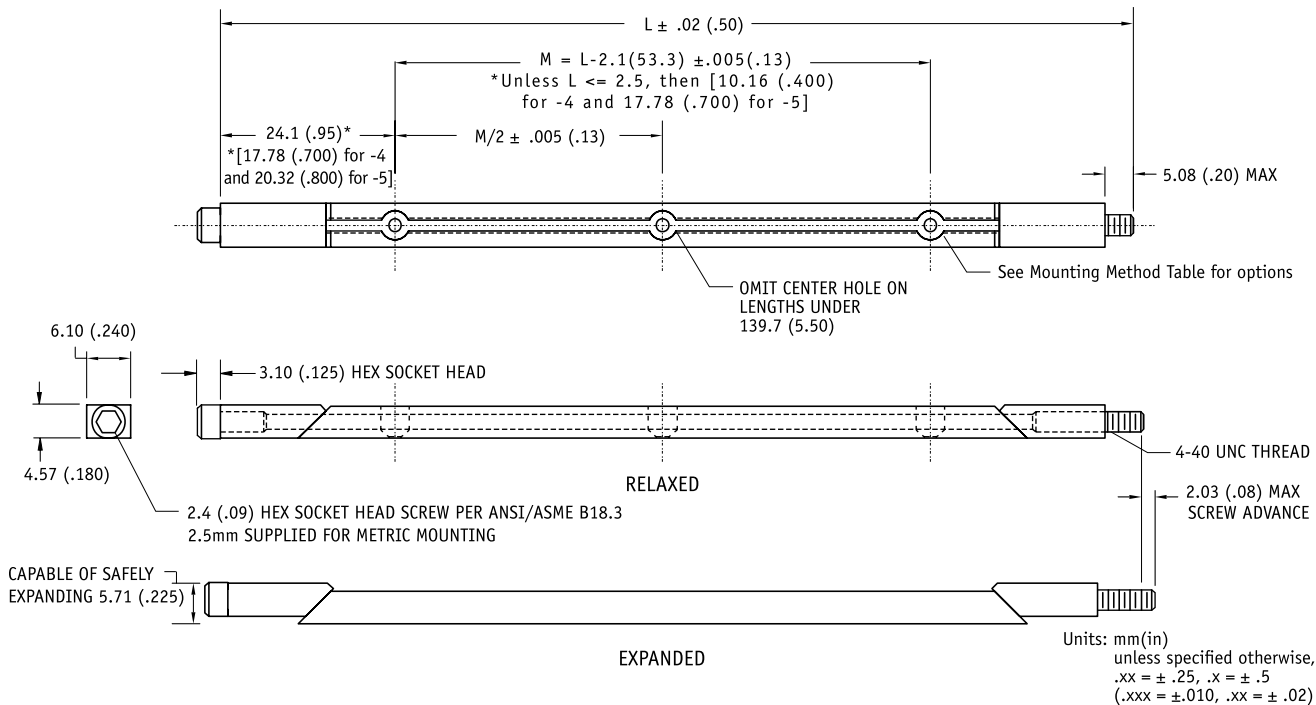
### LF OPTION

Provides additional resistance to shock and vibration (adds 5.1 (.20) to screw length)



### LN OPTION

Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



### Part Number Code (See example below)

**Series 41 WEDGE-LOK Three-piece**    **41**    -X    -X    -X    -X    -X    -X  
**Length**  
 Length in .500 (12.7) increments \_\_\_\_\_ 4 [2.00 (50.8)]  
 \_\_\_\_\_ to 24 [12.00 (304.8)]  
**Finish**  
 Chem Film \_\_\_\_\_ [Blank]  
 or select code letter from Finish Table \_\_\_\_\_ 1  
**Lock/Flat Washers and Locknut**  
 Lock Washer and Flat Washer \_\_\_\_\_ **LF**  
 None \_\_\_\_\_ [Blank]  
 Lock Nut \_\_\_\_\_ **LN**  
 None \_\_\_\_\_ [Blank]  
**Mounting**  
 Standard Rivet Holes \_\_\_\_\_ [Blank]  
 or select code letter from Mounting Method Table \_\_\_\_\_ 2  
**Lock Patch**  
 Lock Patch \_\_\_\_\_ **L**  
 None \_\_\_\_\_ [Blank]

### Part Number Code example: 41-8-LF

Series 41 WEDGE-LOK Three-piece, 4.00-in. (101.6-mm) long, chem film finish, with Lock Washer and Flat Washer option, and standard rivet hole mounting.

### 1 FINISH TABLE

Code	Letter	Finish (see pg.11 for RoHS Compliance)
[blank]		Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC		Chemical Film per MIL-C-5541, Class 1A, Clear
EN		Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N		Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B		Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3		Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D		Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

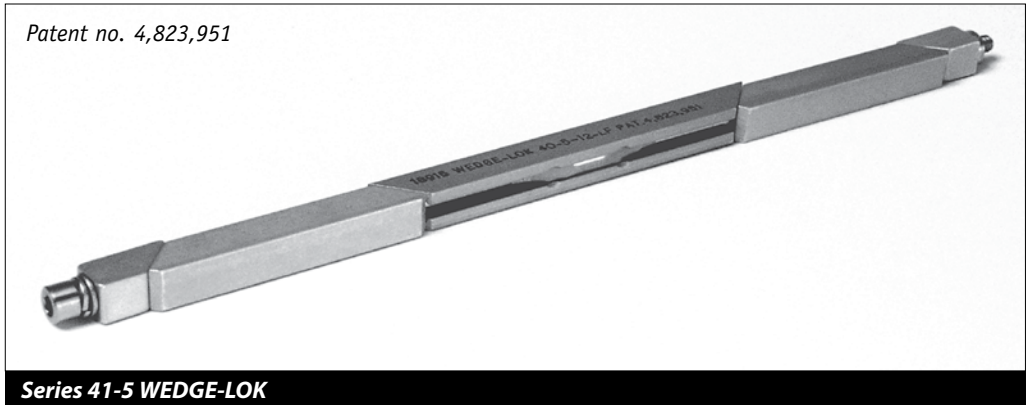
Code	Letter	Method
NONE		Rivet Mount ( $\emptyset 1.70 +.10/-.03$ (.067 +.004/.001) THRU $\sqcup \emptyset 3.96 (.156) \varnothing 3.30 (.200) \sphericalangle \emptyset 3.56 (.140) \times 100^\circ$ )
A		No mounting holes
S		2-56 UNC-2B tapped hole
T		0-80 UNF-2B tapped hole
M2		M2 x .40 tapped hole
M		M2.5 x .45 tapped hole
P		Indexing Pins $\emptyset .062 \times .040$ " (two pins only)

Indexing pins (-P) and rivet (NONE) parts are shipped unassembled.  
 Center wedge is unplated and unmarked for Indexing pins (-P) method.

FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION**  
6.10 (.240) X 4.57 (.180) PROFILE

## SCREW

.09-in. or 2.5-mm hex. socket head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

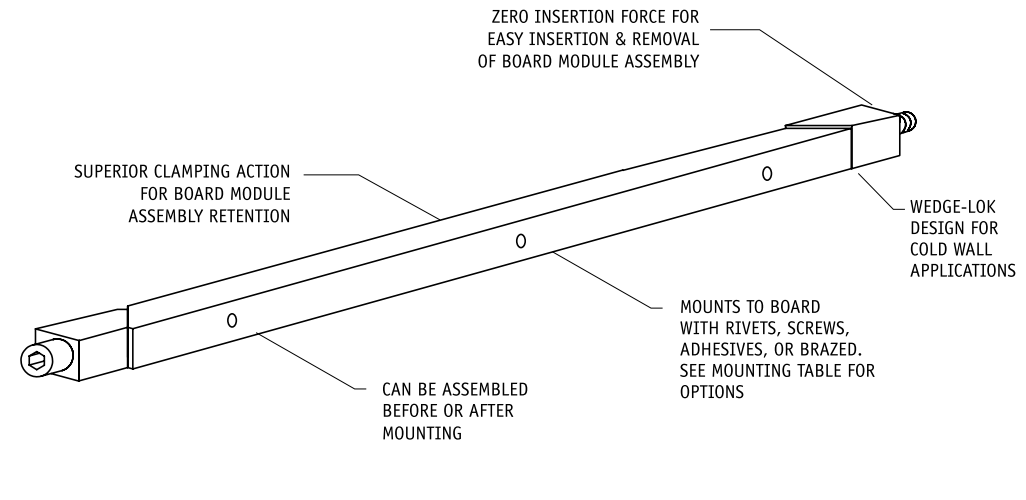
## OPTION LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002



## LOCKNUT

### Material:

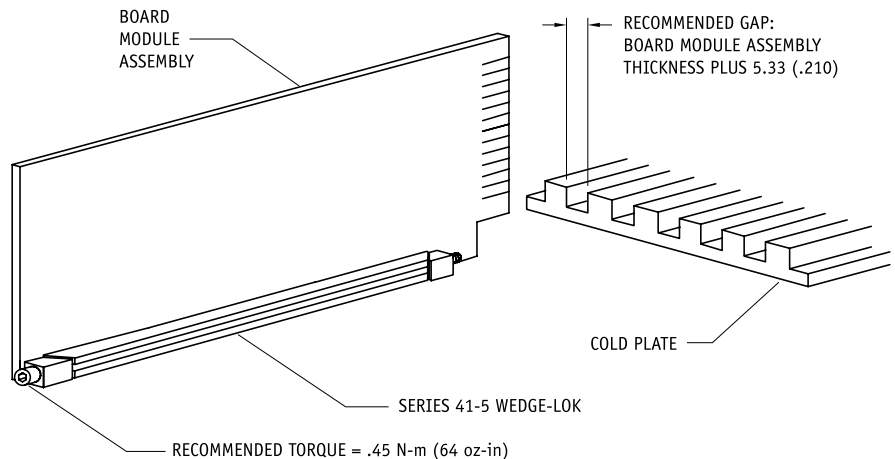
Type A286 stainless steel per ASTM AMS 5525 (or similar)

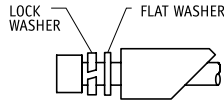
### Finish:

Silver plate per AMS 2410

## WEIGHT

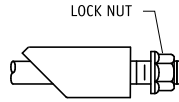
.083 oz./in. (0.93 g/cm)





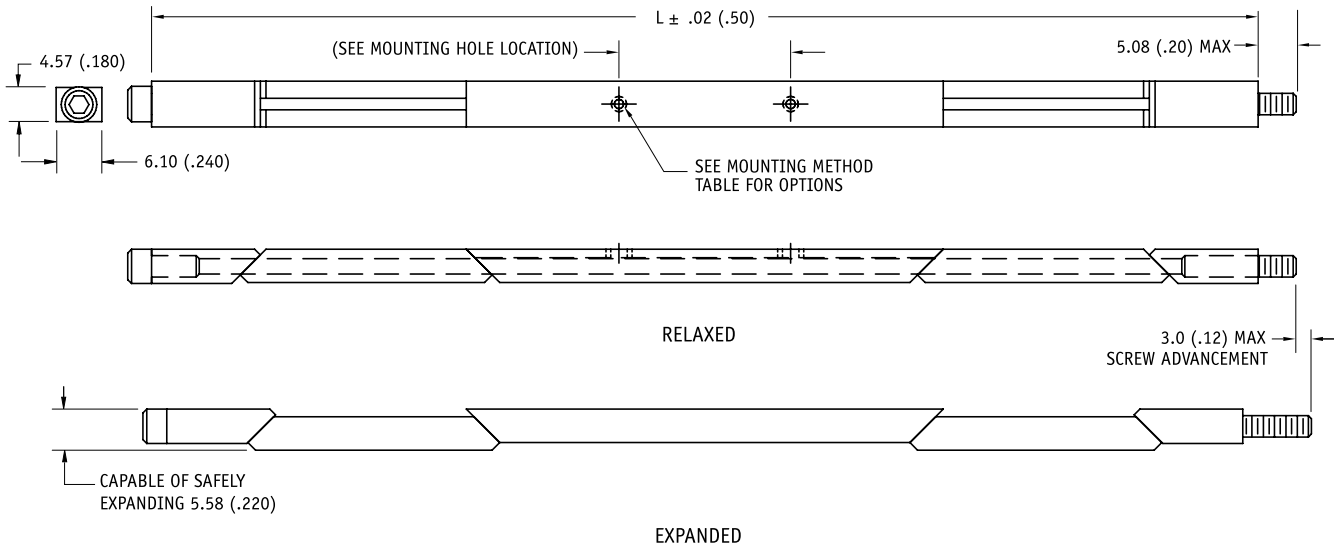
### LF OPTION

Provides additional resistance to shock and vibration (adds 5.1 (.20) to screw length)



### LN OPTION

Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



**Part Number Code** (See example below)

**Series 41-5 WEDGE-LOK Five-piece**    41-5    -X    -X    -X    -X    -X    -X

**Length**  
 Length in .500 (12.7) increments\_10 [5.00 (127.0)]  
 \_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**  
 Chem Film \_\_\_\_\_ [Blank]  
 or select code letter from Finish Table \_\_\_\_\_ 1

**Lock/Flat Washers and Locknut**  
 Lock Washer and Flat Washer \_\_\_\_\_ LF  
 None \_\_\_\_\_ [Blank]

Lock Nut \_\_\_\_\_ LN  
 None \_\_\_\_\_ [Blank]

**Mounting**  
 Standard Rivet Holes \_\_\_\_\_ [Blank]  
 or select code letter from Mounting Method Table \_\_\_\_\_ 2

**Lock Patch**  
 Lock Patch \_\_\_\_\_ L  
 None \_\_\_\_\_ [Blank]

**Part Number Code example: 41-5-8-LF**  
 Series 41-5 WEDGE-LOK 5-piece, 4.00-in. (101.6-mm) long, chem film finish, with Lock Washer and Flat Washer option, and standard rivet hole mounting.

**1 FINISH TABLE**

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

**2 MOUNTING METHOD TABLE**

Code Letter	Method
NONE	2-56 UNC-2B tapped hole
R	Rivet Mount (Ø 1.70 +.10/-.03 (.067 +.004/-.001) THRU □ Ø 3.96 (.156) ≅ 3.30 (.200) √ Ø 3.56 (.140) x 100°)
A	No Mounting Holes
T	0-80 UNF-2B tapped hole
M2	M2 x .40 tapped hole
M	M2.5 x .45 tapped hole
P	Indexing Pins Ø.062 x .040" (two pins only)

Indexing pins (-P) and rivet (-R) parts are shipped in un-snapped configuration. Center wedge is unplated and unmarked for Indexing pins (-P) method.

**FOR MECHANICAL AND THERMAL PERFORMANCE  
 SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	

## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

## SCREW

.09-in. or 2.5-mm hex. socket head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## OPTION LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

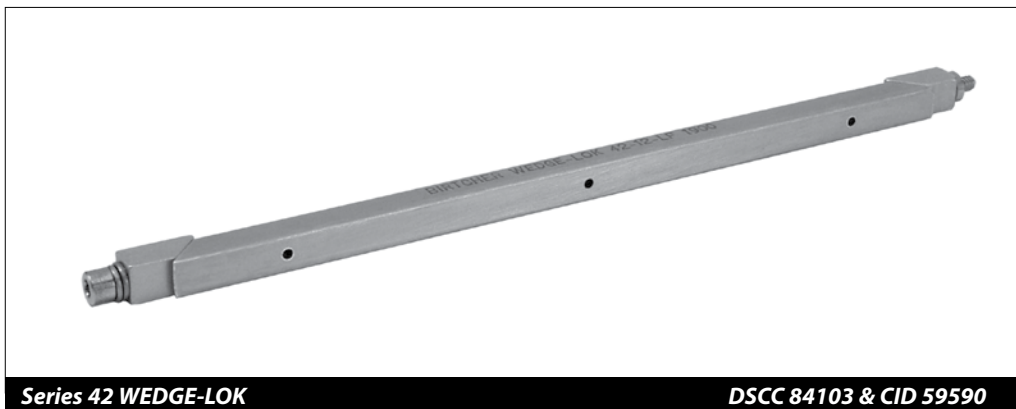
Type A286 stainless steel per ASTM AMS 5525 (or similar)

### Finish:

Silver plate per AMS 2410

## WEIGHT

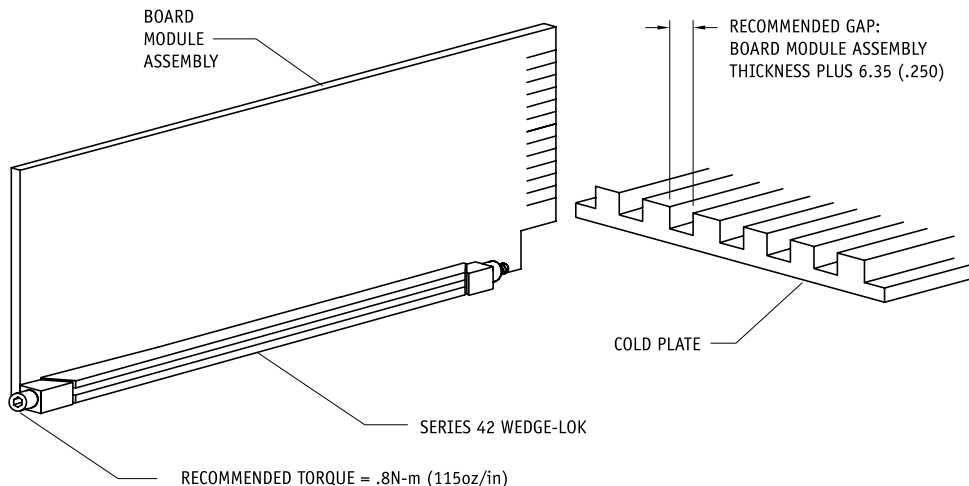
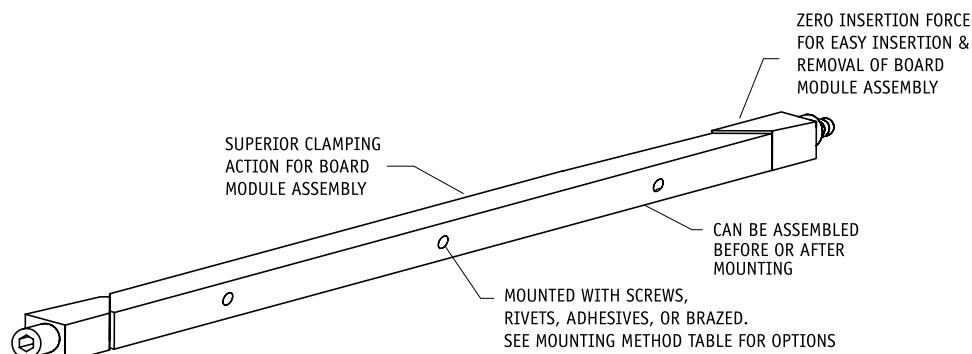
.080 oz./in. (0.89 g/cm)

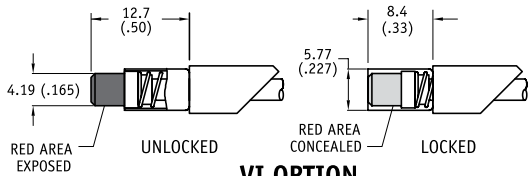


Series 42 WEDGE-LOK

DSCC 84103 & CID 59590

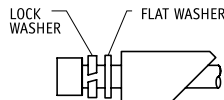
**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, & HEAT DISSIPATION**  
5.72 (.225) X 5.72 (.225) PROFILE





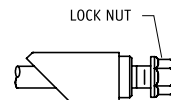
### VI OPTION

Indicates assembly is unlocked (adds 5.1 (.20) to screw length)



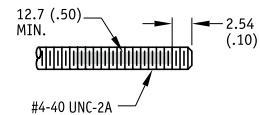
### LF OPTION

Provides additional resistance to shock and vibration (adds 2.5 (.10) to screw length)



### LN OPTION

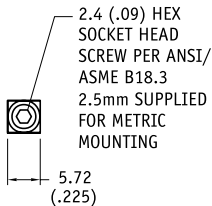
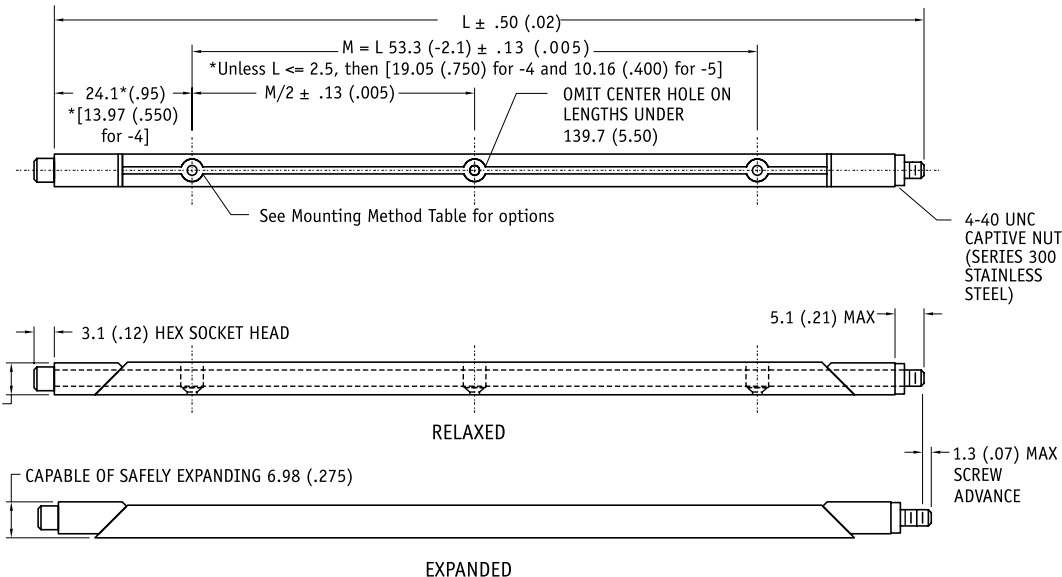
Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



### L OPTION

Provides additional resistance to shock and vibration

Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



**Part Number Code** (See example below)

Series 42 WEDGE-LOK Three-piece    42    x    -x    -x    -x    -x    -x    -x

**Optional Visual Indicator**

Visual Indicator \_\_\_\_\_ VI

None \_\_\_\_\_ [Blank]

**Length**

Length in .500 (12.7) increments \_\_\_\_ 4 [2.00 (50.8)]

\_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**

Chem Film \_\_\_\_\_ [Blank]

or select code letter from Finish Table \_\_\_\_\_ 1

**Lock/Flat Washers and Locknut**

Lock Washer and Flat Washer \_\_\_\_\_ LF

None \_\_\_\_\_ [Blank]

Lock Nut \_\_\_\_\_ LN

None \_\_\_\_\_ [Blank]

**Mounting**

Standard Rivet Holes \_\_\_\_\_ [Blank]

or select code letter from Mounting Method Table \_\_\_\_\_ 2

**Lock Patch**

Lock Patch \_\_\_\_\_ L

None \_\_\_\_\_ [Blank]

### 1 FINISH TABLE

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

Code Letter	Method
NONE	Rivet Mount (Ø 1.70 +.10/-.03 (.067 +.004/.001) THRU □ Ø 3.96 (.156) □ 3.30 (.200) √ Ø 3.56 (.140) x 100°)
A	No mounting holes
S	2-56 UNC-2B tapped hole
T	0-80 UNF-2B tapped hole
M2	M2 x .40 tapped hole
M	M2.5 x .45 tapped hole
P	Indexing Pins Ø.062 x .040" (two pins only)

Indexing pins (-P) and rivet (NONE) parts are shipped unassembled.  
Center wedge is unplated and unmarked for Indexing pins (-P) method.

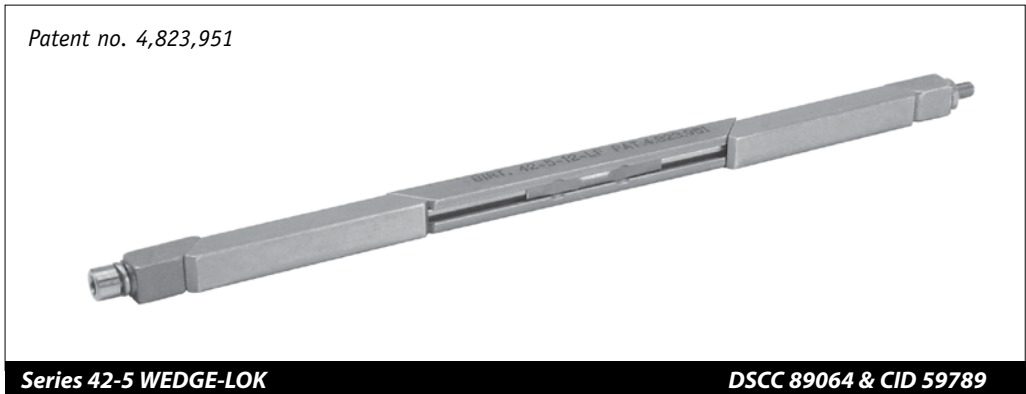
**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

### Part Number Code example: 42VI-10-B3D-LF

Series 42 WEDGE-LOK Three-piece, 5.00-in. (127.0-mm) long, hard black anodize finish with dry film lube, with Lock Washer and Flat Washer option, standard rivet hole mounting.

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

## SCREW

.09-in. or 2.5-mm hex. socket head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## ALIGNMENT SPRINGS

### Material:

Beryllium Copper QQ-C-533

### Finish:

Nickel QQ-N-290 Class I, Grade G, Bright

## OPTION

### LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

Type A286 stainless steel per ASTM AMS 5525 (or similar)

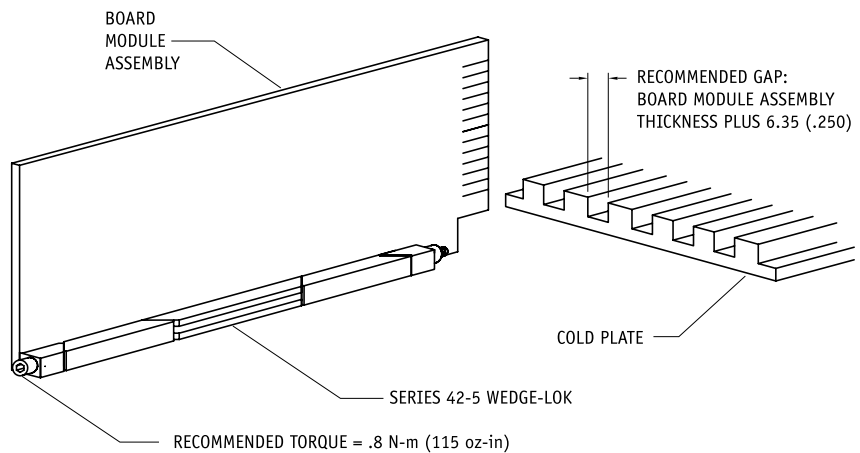
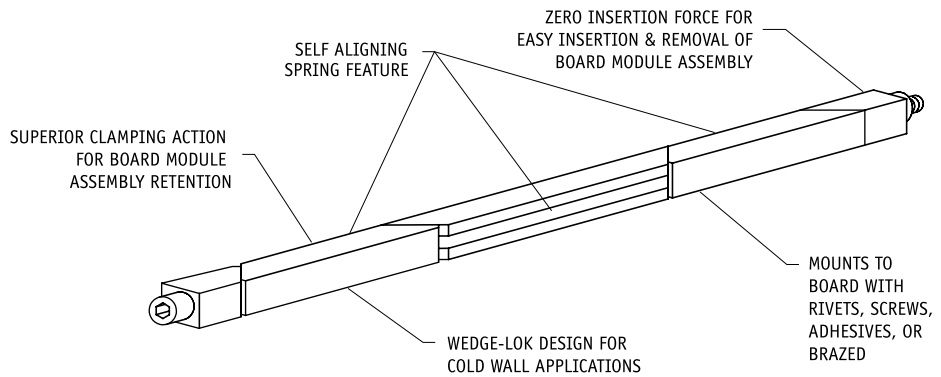
### Finish:

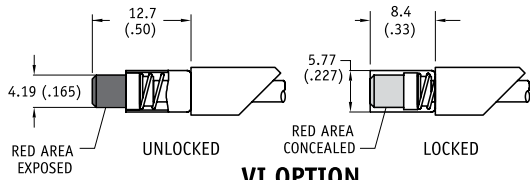
Silver plate per AMS 2410

## WEIGHT

.088 oz./in. (.98 g/cm)

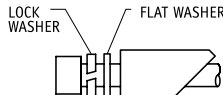
**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION**  
5.72 (.225) X 5.72 (.225) PROFILE





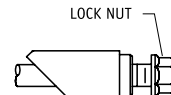
### VI OPTION

Indicates assembly is unlocked  
(adds 4.8 (SB .20) to screw length)



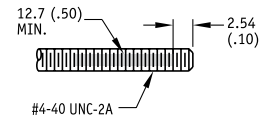
### LF OPTION

Provides additional resistance to shock and vibration (adds 1.5 (SB .10) to screw length)



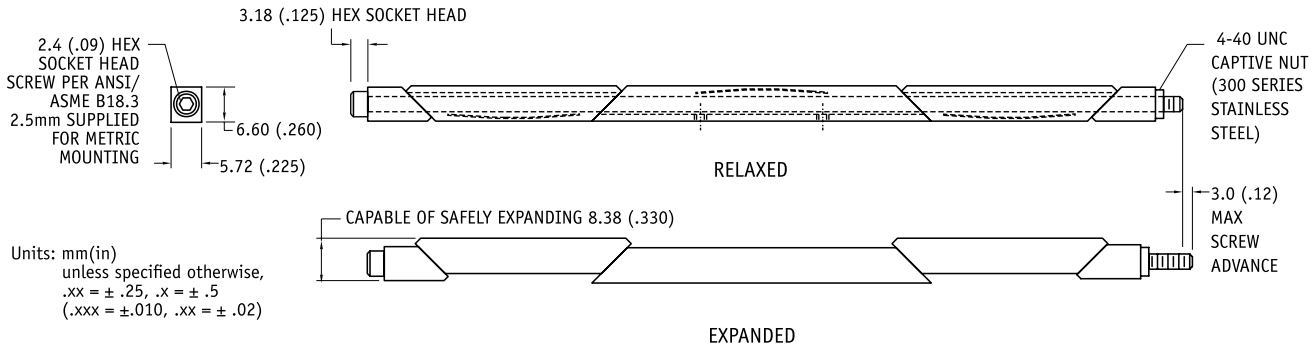
### LN OPTION

Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



### L OPTION

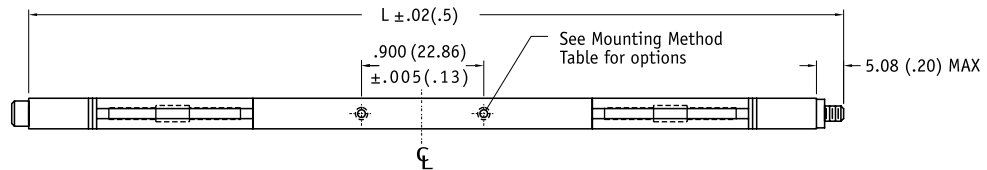
Provides additional resistance to shock and vibration



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

### MOUNTING HOLE LOCATION

22.86 (.900) hole spacing centered on mounting body  
-10 thru -13 2 holes  
-14 thru -24 4 holes



### Part Number Code (See example below)

Series 42-5 WEDGE-LOK Five-piece 42-5 x -x -x -x -x -x -x

#### Optional Visual Indicator

Visual Indicator \_\_\_\_\_ VI  
None \_\_\_\_\_ [Blank]

#### Length

Length in .500 (12.7) increments \_\_ 10 [5.00 (127.0)]  
\_\_\_\_\_ to 24 [12.00 (304.8)]

#### Finish

Chem Film \_\_\_\_\_ [Blank]  
or select code letter from Finish Table \_\_\_\_\_ 1

#### Lock/Flat Washers and Locknut

Lock Washer and Flat Washer \_\_\_\_\_ LF  
None \_\_\_\_\_ [Blank]

Lock Nut \_\_\_\_\_ LN  
None \_\_\_\_\_ [Blank]

#### Mounting

Standard 2-56 screws \_\_\_\_\_ [Blank]  
or select code letter from Mounting Method Table \_\_\_\_\_ 2

#### Lock Patch

Lock Patch \_\_\_\_\_ L  
None \_\_\_\_\_ [Blank]

### 1 FINISH TABLE

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
A	No Mounting Holes
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

Code Letter	Method
NONE	Rivet Mount (Ø 1.70 +.10/-.03 (.067 +.004/-.001) THRU LØ 3.96 (.156) ~ 3.30 (.200) √ Ø 3.56 (.140) x 100°)
A	No mounting holes
S	2-56 UNC-2B tapped hole
T	0-80 UNF-2B tapped hole
M2	M2 x .40 tapped hole
M	M2.5 x .45 tapped hole
P	Indexing Pins Ø.062 x .040" (two pins only)

Indexing pins (-P) and rivet (-R) parts are shipped unassembled.  
Center wedge is unplated and unmarked for Indexing pins (-P) method.

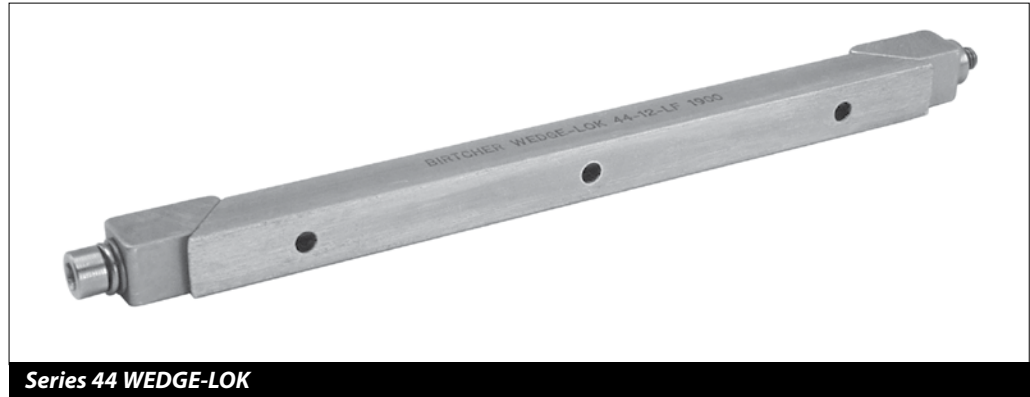
**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

### Part Number Code example: 42-5-18-LN-R

Series 42-5 WEDGE-LOK Five-piece, 9.00-in. (228.6-mm) long, chem film finish, with Lock Nut option, rivet mount.

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

## SCREW

.14-in. (3.6-mm) hex. socket head cap screw

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## OPTION

### LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

Type A286 stainless steel per ASTM AMS 5525 (or similar)

### Finish:

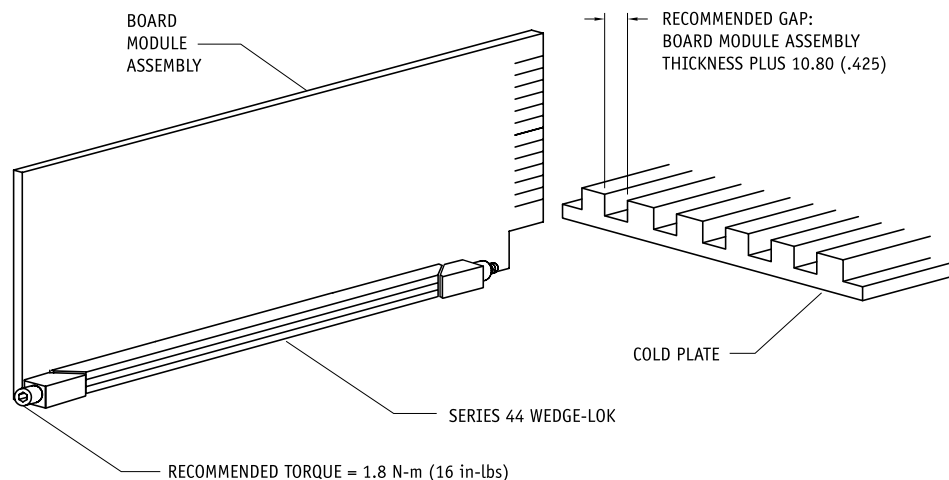
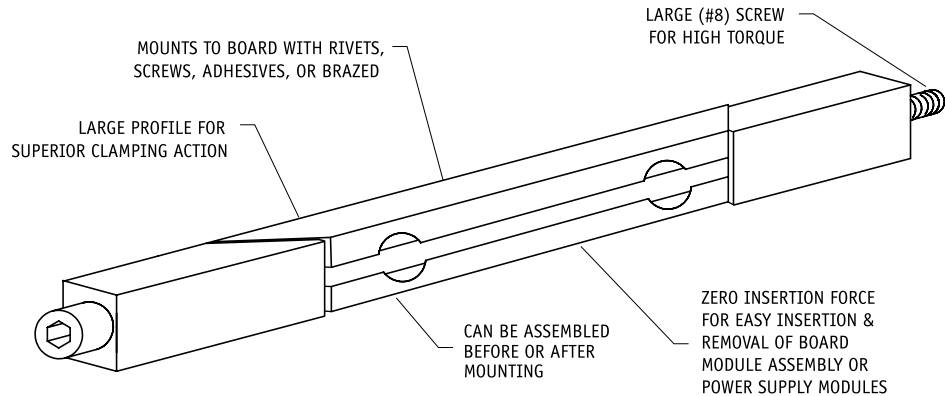
Silver plate per AMS 2410

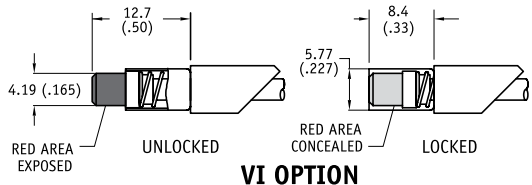
## WEIGHT

.250 oz./in. (2.79 g/cm)

**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION  
POWER SUPPLY MOUNTING**

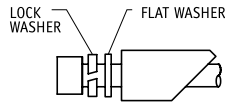
9.53 (.375) X 9.78 (.385) PROFILE





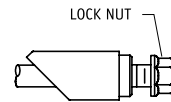
### VI OPTION

Indicates assembly is unlocked (adds 4.8 (.19) to screw length)



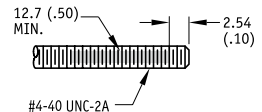
### LF OPTION

Provides additional resistance to shock and vibration (adds 1.5 (.06) to screw length)



### LN OPTION

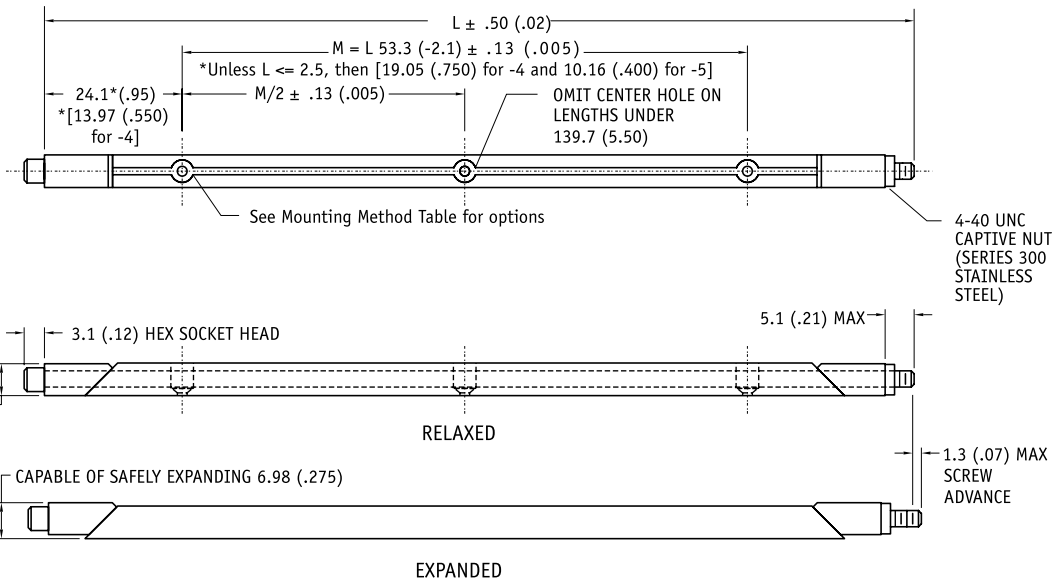
Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



### L OPTION

Provides additional resistance to shock and vibration

Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



**Part Number Code** (See example at right)  
**Series 44 WEDGE-LOK Three-piece Heavy Duty**

44 X -X -X -X -X -X -X

**Optional Visual Indicator**  
 Visual Indicator \_\_\_\_\_ **VI**  
 None \_\_\_\_\_ **[Blank]**

**Length**  
 Length in .500 (12.7) increments \_\_\_\_ 6 [3.00 (76.2)]  
 \_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**  
 Chem Film \_\_\_\_\_ **[Blank]**  
 or select code letter from Finish Table \_\_\_\_\_ 1

**Lock/Flat Washers and Locknut**  
 Lock Washer and Flat Washer \_\_\_\_\_ **LF**  
 None \_\_\_\_\_ **[Blank]**

Lock Nut \_\_\_\_\_ **LN**  
 None \_\_\_\_\_ **[Blank]**

**Mounting**  
 Standard Rivet Holes \_\_\_\_\_ **[Blank]**  
 or select code letter from Mounting Method Table \_\_\_\_\_ 2

**Lock Patch**  
 Lock Patch \_\_\_\_\_ **L**  
 None \_\_\_\_\_ **[Blank]**

**Part Number Code example: 44-12-LF**  
 Series 44 WEDGE-LOK Three-piece Heavy Duty, 6.00-in. (152.4-mm) long, chem film finish, with Lock Washer and Flat Washer option.

### 1 FINISH TABLE

Code	Letter	Finish (see pg.11 for RoHS Compliance)
[blank]		Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC		Chemical Film per MIL-C-5541, Class 1A, Clear
EN		Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N		Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B		Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3		Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D		Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

Code	Letter	Method
[blank]		Rivet Mount (∅ 3.45 +.10/-.03 (.136 +.004/.001) THRU □ ∅ 4.95 (.195) ≡ 7.65 (.305) ∨ ∅ 4.95 (.195) x 100°)
A		No mounting holes
F		4-40 UNC-2B tapped hole
M		M2.5 x .45 tapped hole
M2		M2 x .40 tapped hole
M3		M3 x .50 tapped hole
P		Indexing Pins ∅.062 x .040" (two pins only)
S		2-56 UNC-2B tapped hole
T		0-80 UNF-2B tapped hole

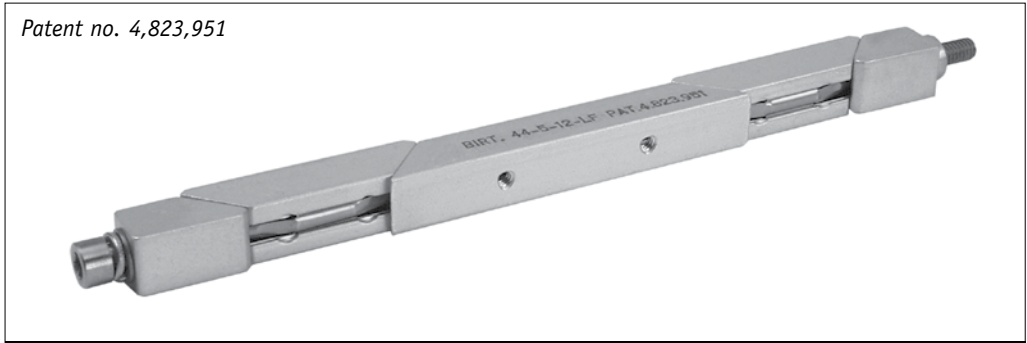
Indexing pins (-P) and rivet (-R) parts are shipped unassembled.  
 Center wedge is unplated and unmarked for Indexing pins (-P) method.

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	●●●●●
Relative Retention Force*	●●●●●
Relative Thermal Resistance*	●●●●●
Relative Price	●●●●●
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	

Patent no. 4,823,951



Series 44-5 WEDGE-LOK

CID 59789

## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

## SCREW

.14-in. (3.6-mm) hex. socket head cap screw

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## ALIGNMENT SPRINGS

### Material:

Beryllium Copper QQ-C-533

### Finish:

Nickel per QQ-N-290, Class 1, grade G, Bright

## OPTION

### LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## LOCKNUT

### Material:

Type A286 stainless steel per ASTM AMS 5525 (or similar)

### Finish:

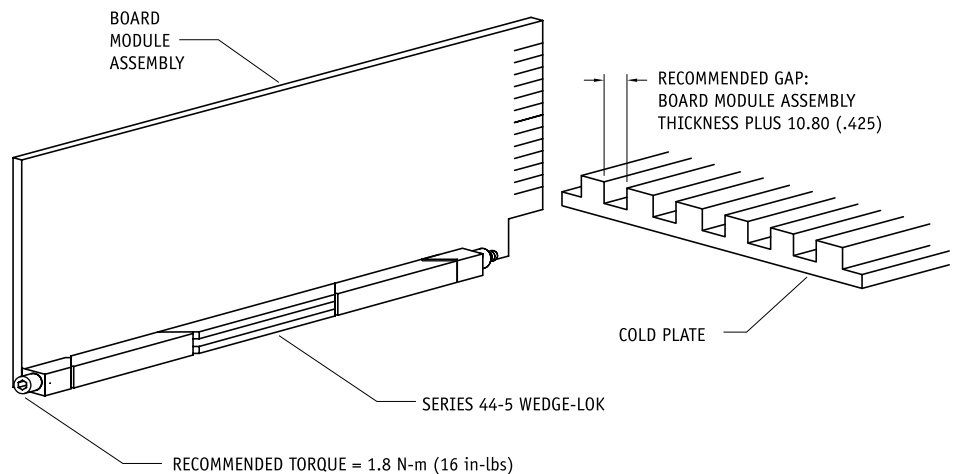
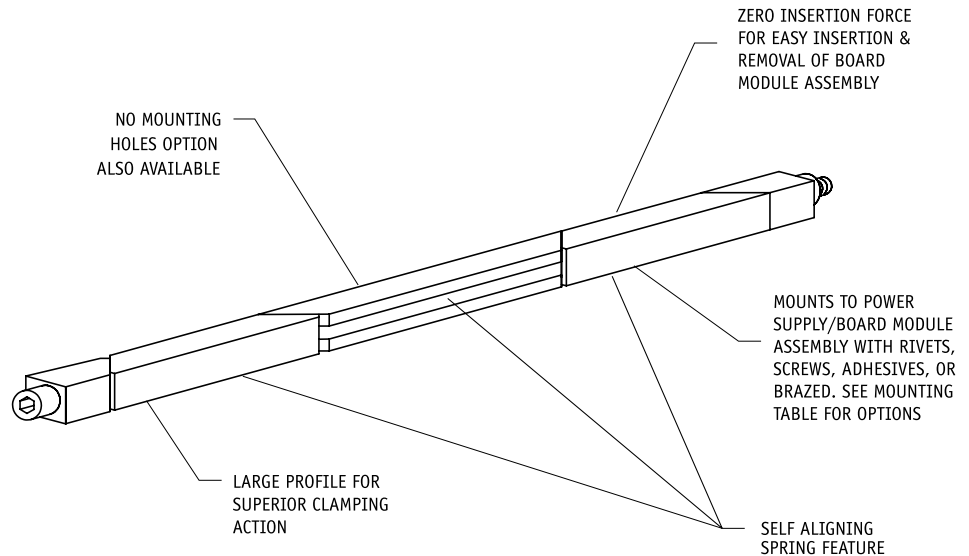
Silver plate per AMS 2410

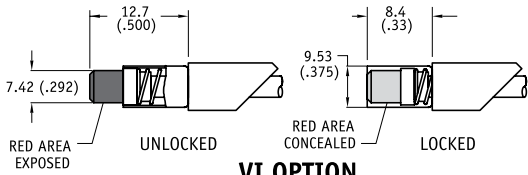
## WEIGHT

.250 oz./in. (2.79 g/cm)

**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION  
POWER SUPPLY MOUNTING**

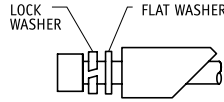
9.53 (.375) X 9.53 (.375) PROFILE





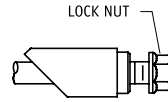
### VI OPTION

Indicates assembly is unlocked (adds 5.1 (.20) to screw length)



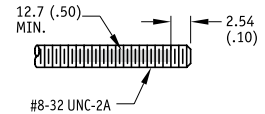
### LF OPTION

Provides additional resistance to shock and vibration (adds 2.5 (.10) to screw length)



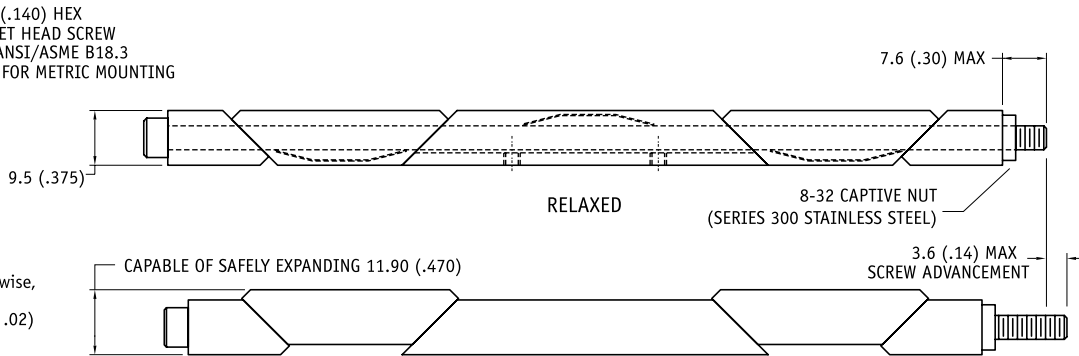
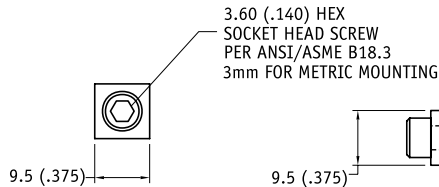
### LN OPTION

Captivates rear wedge when untorqued (adds 2.5 (.10) to screw length)



### L OPTION

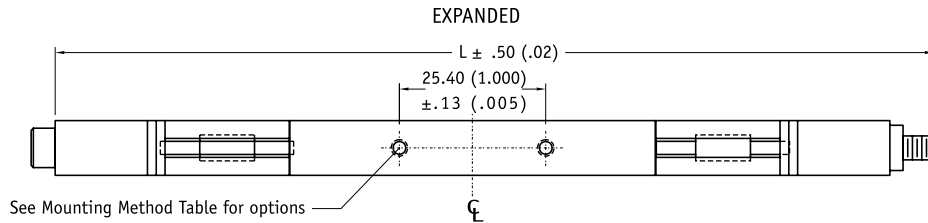
Provides additional resistance to shock and vibration



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

### MOUNTING DIMENSIONS

25.40 (1.000) hole spacing centered on mounting body  
-10 thru -13 2 holes  
-14 thru -24 4 holes



See Mounting Method Table for options

### Part Number Code (See example below)

#### Series 44-5 WEDGE-LOK Five-piece Heavy Duty

44-5 x -x -x -x -x -x -x  
Optional Visual Indicator  
Visual Indicator \_\_\_\_\_ VI  
None \_\_\_\_\_ [Blank]

#### Length

Length in .500 (12.7) increments \_\_\_ 10 [5.00 (127.5)]  
\_\_\_\_\_ to 24 [12.00 (304.8)]

#### Finish

Chem Film \_\_\_\_\_ [Blank]  
or select code letter from Finish Table \_\_\_\_\_ 1

#### Lock/Flat Washers and Locknut

Lock Washer and Flat Washer \_\_\_\_\_ LF  
None \_\_\_\_\_ [Blank]

#### Lock Nut

Lock Nut \_\_\_\_\_ LN  
None \_\_\_\_\_ [Blank]

#### Mounting

Standard 4-40 threaded holes \_\_\_\_\_ [Blank]  
or select code letter from Mounting Method Table \_\_\_\_\_ 2

#### Lock Patch

Lock Patch \_\_\_\_\_ L  
None \_\_\_\_\_ [Blank]

### Part Number Code example: 44-5-15-LN-L

Series 44-5 WEDGE-LOK Five-piece Heavy Duty, 7.50-in. (190.5-mm) long, chem film finish, with Lock Nut option, standard 4-40 threaded hole mounting, and Lock Patch option.

### 1 FINISH TABLE

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.0005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

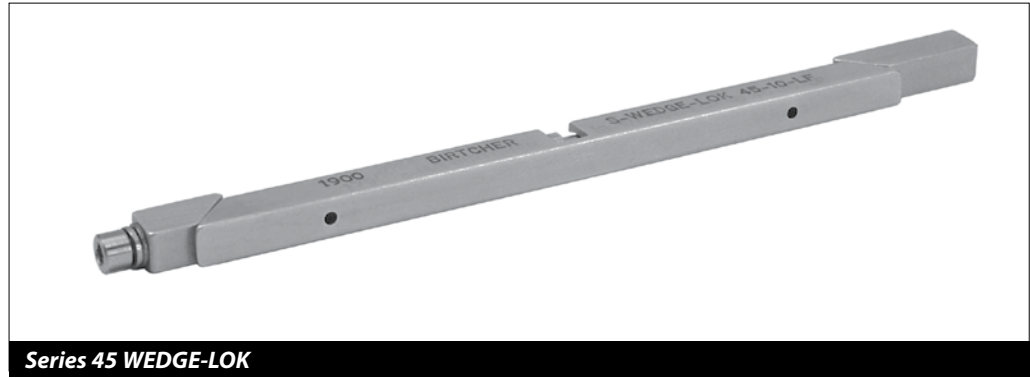
Code Letter	Method
NONE	4-40 UNC-2B tapped hole
A	No Mounting Holes
M	Metric M2.5 x .45
M2	Metric M2 x .40
M3	Metric M3 x .50
P	Indexing Pins Ø.062 x .040" (two pins only)
R	Rivet Mount (Ø 3.45 +.10/-0.03 (.136 +.004/.001) THRU L Ø 4.95 (.195) < 7.65 (.305) < Ø 4.95 (.195) x 100°)
S	2-56 UNC-2B tapped hole
T	0-80 UNF-2B tapped hole

Indexing pins (-P) and rivet (-R) parts are shipped unassembled.  
Center wedge is unplated and unmarked for Indexing pins (-P) method.

**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



## WEDGES

### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

### Finish:

See finish table on opposite page

## SCREW

.09-in. or 2.5-mm hex socket head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## WASHERS & RING

### Material:

Stainless Steel per QQ-S-763, ASTM-A-582

### Finish:

Passivate per Mil-S-5002

## OPTION

### LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

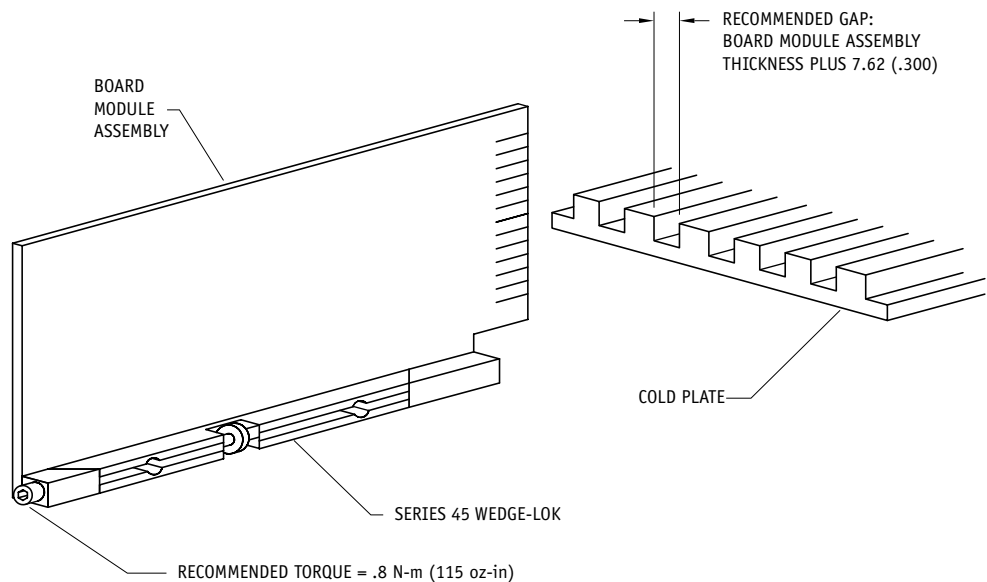
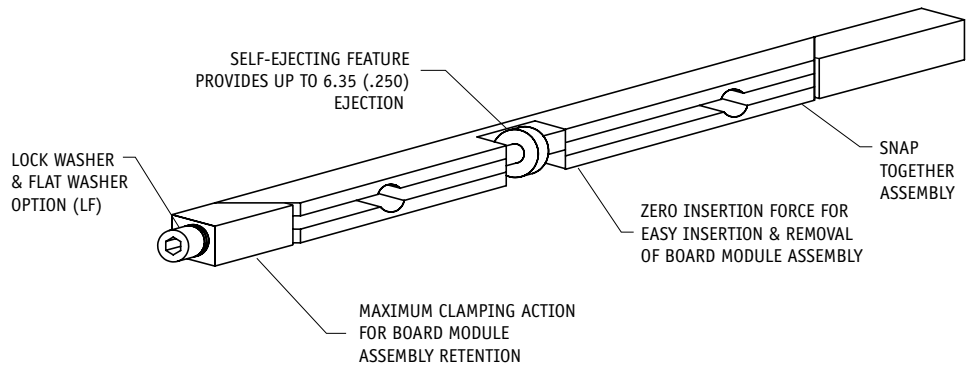
Passivate per Mil-S-5002

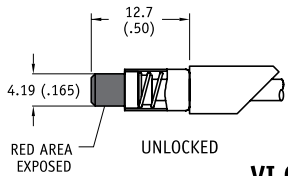
## WEIGHT

.091 oz./in. (1.07 g/cm)

**DESIGNED FOR HEAVY SHOCK, VIBRATION,  
HEAT DISSIPATION, & INITIAL EJECTION**

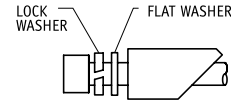
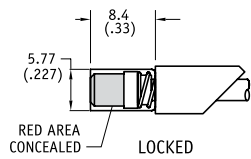
5.72 (.225) X 6.60 (.260) PROFILE





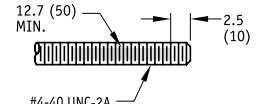
### VI OPTION

Indicates assembly is unlocked (adds 5.1 (.20) to screw length & -L length)



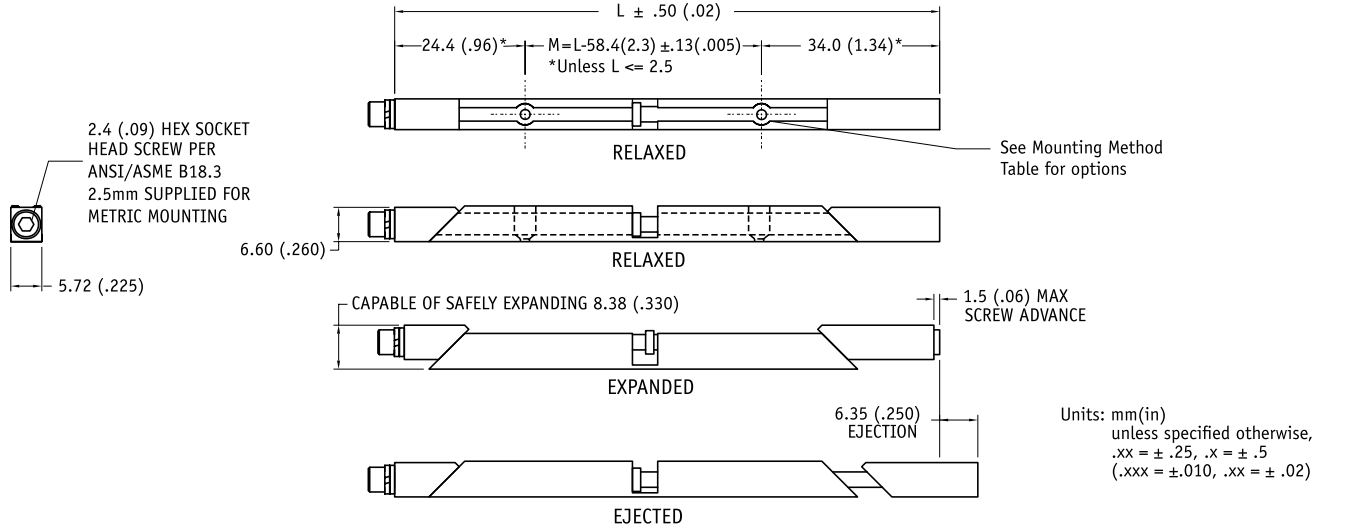
### LF OPTION

Provides additional resistance to shock and vibration (adds 2.5 (.10) to screw length)

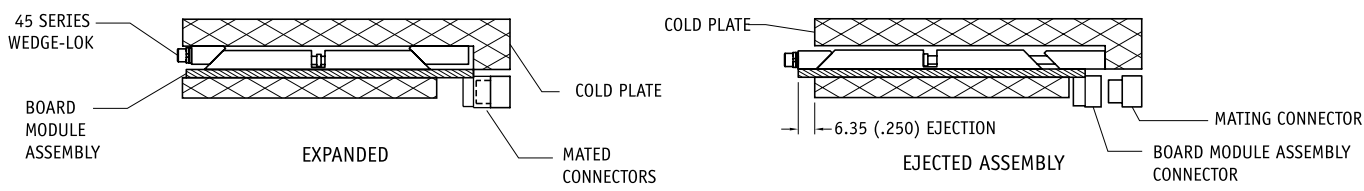


### L OPTION

Provides additional resistance to shock and vibration



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



**Part Number Code** (See example below)

**Series 45 WEDGE-LOK Three-piece Ejector**    45    x    -x    -x    -x    -x

**Optional Visual Indicator**

Visual Indicator \_\_\_\_\_ **VI**

None \_\_\_\_\_ **[Blank]**

**Length**

Length in .500 (12.7) increments \_\_\_\_\_ 4 [2.00 (50.8)]

\_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**

Chem Film \_\_\_\_\_ **[Blank]**

or select code letter from Finish Table \_\_\_\_\_ 1

**Washers**

Lock Washer and Flat Washer \_\_\_\_\_ **LF**

None \_\_\_\_\_ **[Blank]**

**Mounting**

Standard rivet holes \_\_\_\_\_ **[Blank]**

or select code letter from Mounting Method Table \_\_\_\_\_ 2

**Lock Patch**

Lock Patch \_\_\_\_\_ **L**

None \_\_\_\_\_ **[Blank]**

**Part Number Code example: 45VI-10-B3-S**

Series 45 WEDGE-LOK Three-piece Ejector, 5.00-in. (127.0-mm) long with visual indicator, hard black anodize finish, 2-56 UNC screw mounted

### 1 FINISH TABLE

Code	Letter	Finish (see pg.11 for RoHS Compliance)
[blank]		Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC		Chemical Film per MIL-C-5541, Class 1A, Clear
EN		Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N		Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B		Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3		Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D		Hard Black Anodize with Dry Film Lube per MIL-L46010

### 2 MOUNTING METHOD TABLE

Code	Letter	Method
NONE		Rivet Mount (Ø 1.70 +.10/-.03 (.067 +.004/-.001) THRU □ Ø 3.96 (.156) □ 3.30 (.200) √ 3.56 (.140) x 100°)
A		No Mounting Holes
S		2-56 UNC-2B tapped hole
T		0-80 UNF-2B tapped hole
M		M2.5 x .45 tapped hole
P		Indexing Pins Ø.062 x .040" (two pins only)

Indexing pins (-P) and rivet (NONE) parts are shipped in un-snapped configuration. Center wedge is unplated and unmarked for Indexing pins (-P) method.

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



## WEDGES

**Material:**  
Aluminum Alloy  
6061-T6 per QQ-A-200/8

**Finish:**  
See finish table on opposite page

## LEVER

**Material:**  
Series 300 stainless steel  
per Mil-S-5059

**Finish:**  
Passivate per Mil-S-5002

## SCREW

**Material:**  
Series 300 stainless steel per  
QQ-S-763 ASTM A-582

**Finish:**  
Passivate per Mil-S-5002

## WASHERS AND SPRING WASHERS

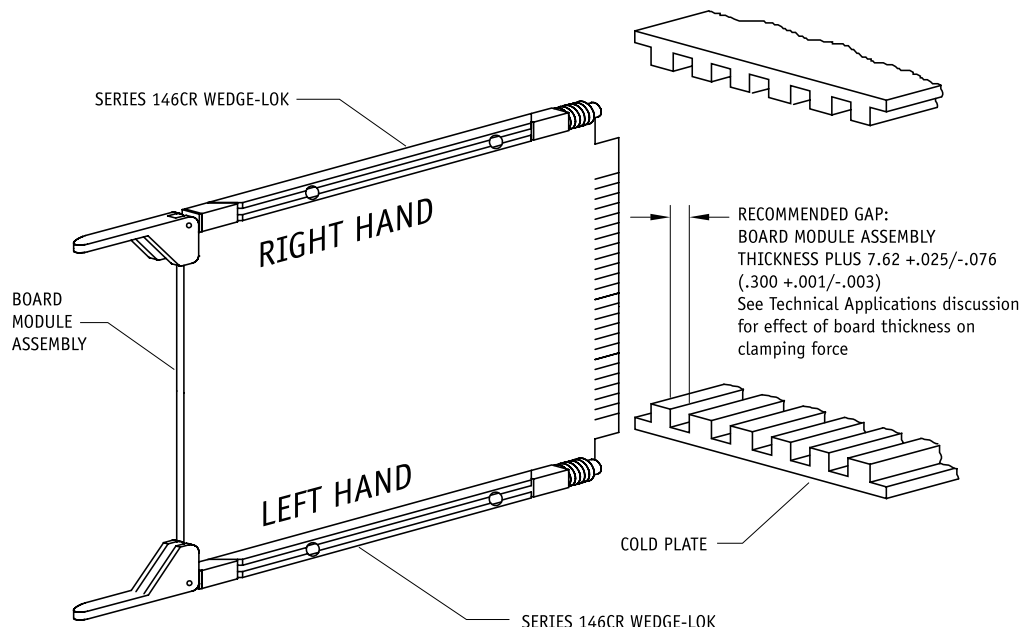
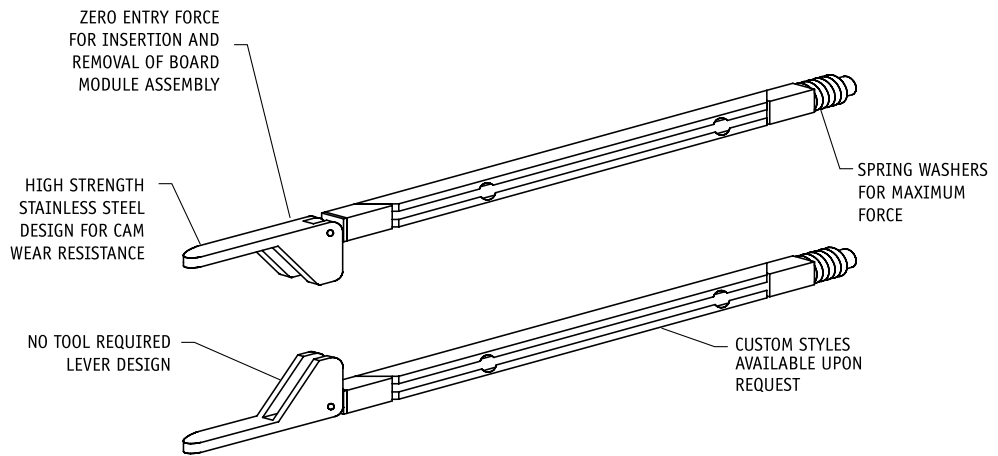
**Material:**  
Series 300 stainless steel per  
QQ-S-763 ASTM A-582

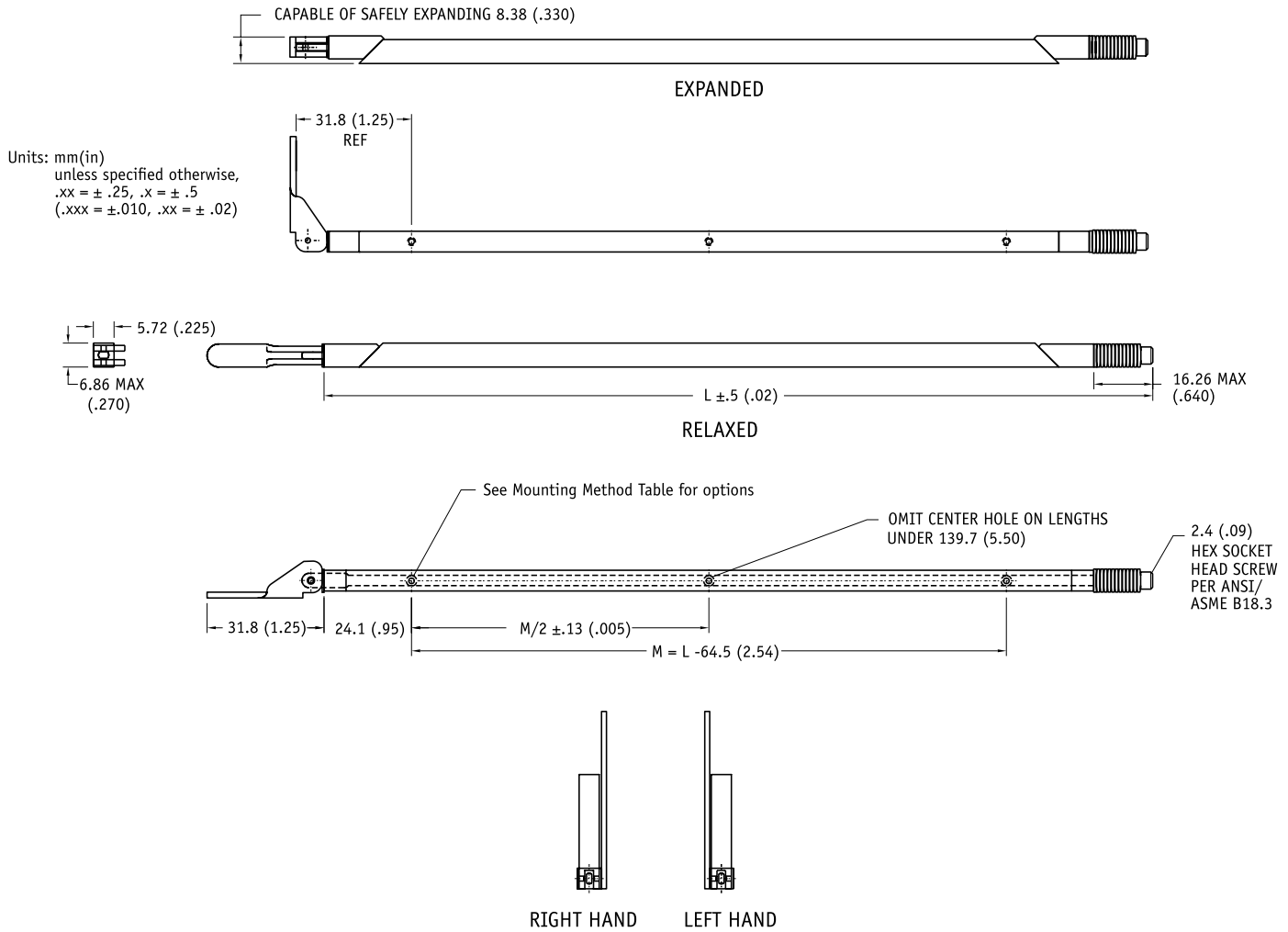
**Finish:**  
Passivate per Mil-S-5002

## WEIGHT

.103 oz./in. (1.22 g/cm)

**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, & HEAT DISSIPATION**  
6.60 (.260) X 6.48 (.255) PROFILE





**Part Number Code** (See example below)

**Series 146CR WEDGE-LOK Three-piece Lever-actuated**

**146CR** -x -x -x -x

**Mounting**  
 Select code letter from Mounting Method Table \_\_\_\_\_ 1

**Length**  
 Length in .500 (12.7) increments \_\_\_\_\_ 6 [3.00 (76.2)]  
 \_\_\_\_\_ to 18 [9.00 (228.6)]

**Finish**  
 Select code letter from Finish Table \_\_\_\_\_ 2

**Lever Action**  
 Left hand \_\_\_\_\_ L  
 Right hand \_\_\_\_\_ R

**Part Number Code example: 146CR-S-12-N-L**

Series 146CR WEDGE-LOK Three-piece Lever actuated, 6.00-in. (152.4-mm) long, Nickel plated, #2-56 UNC screw mounted, left hand

1 MOUNTING METHOD	
Code Letter	Method
R	Rivet Mount (Ø 1.70 +.10/-.03 (.067 +.004/-.001) THRU LØ 3.96 (.156) $\supset$ 3.30 (.200) $\sphericalangle$ Ø 3.56 (.140) x 100°)
A	No Mounting Holes
S	2-56 UNC-2B tapped hole
M	M2.5 X .45 tapped hole
M2	M2 X .40 tapped hole
T	0-80 UNF-2B tapped hole

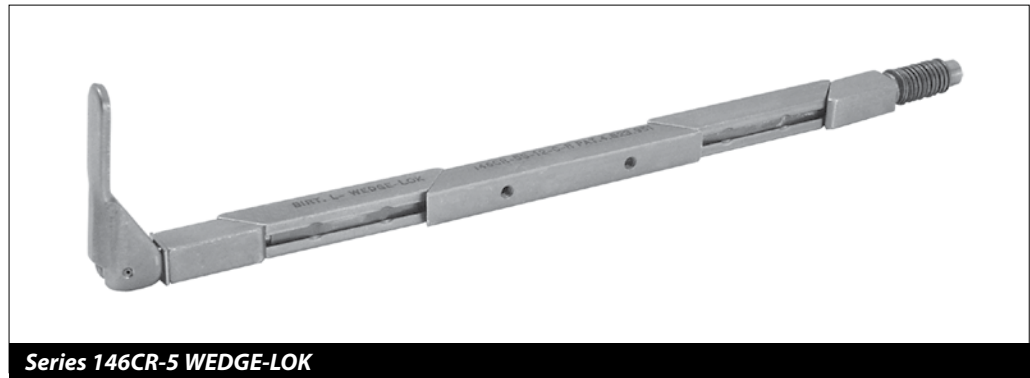
  

2 FINISH TABLE	
Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



Series 146CR-5 WEDGE-LOK

## WEDGES

**Material:**  
Aluminum Alloy  
6061-T6 per QQ-A-200/8

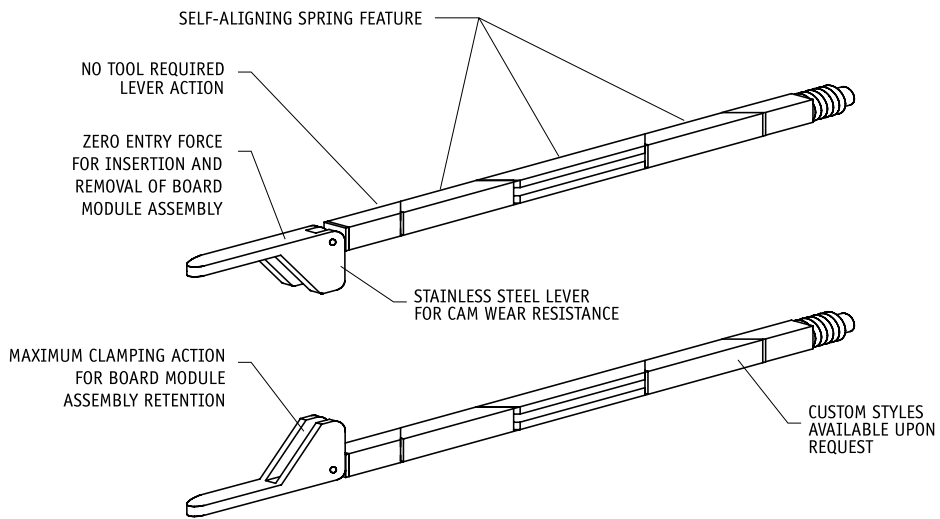
**Finish:**  
Chemical Film per  
Mil-C-5541 Class 1A

**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, & HEAT DISSIPATION**  
6.60 (.260) X 6.48 (.255) PROFILE  
ALSO AVAILABLE IN 7-PIECE CONFIGURATION

## LEVER

**Material:**  
Series 300 stainless steel  
per Mil-S-5059

**Finish:**  
Passivate per Mil-S-5002



## SCREW

**Material:**  
Series 300 stainless steel per  
QQ-S-763 ASTM A-582

**Finish:**  
Passivate per Mil-S-5002

## ALIGNMENT SPRINGS

**Material:**  
Beryllium Copper per QQ-C-533

**Finish:**  
Nickel per QQ-N-290, Class 1, Grade G, Bright

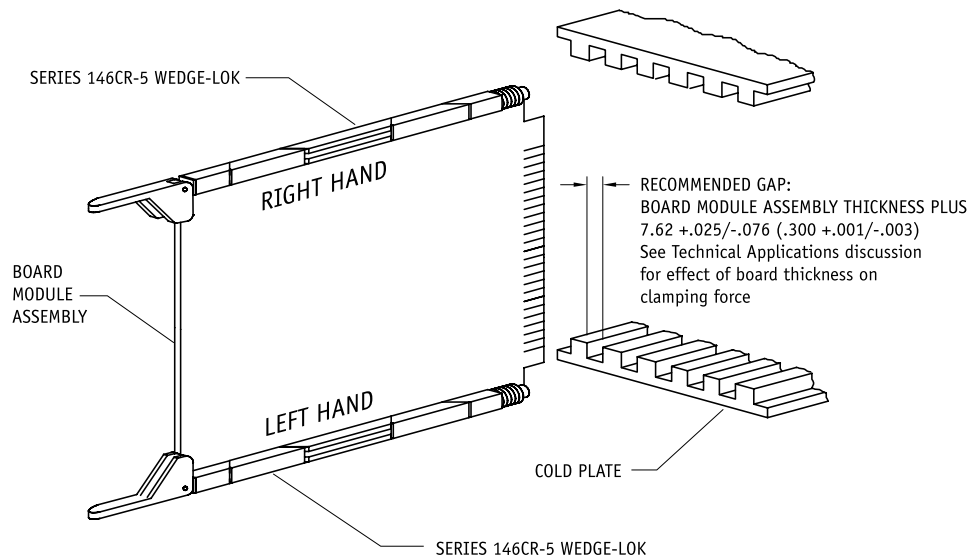
## WASHERS AND SPRING WASHERS

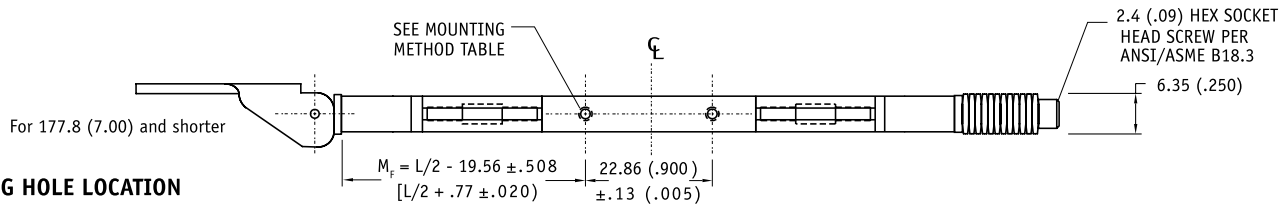
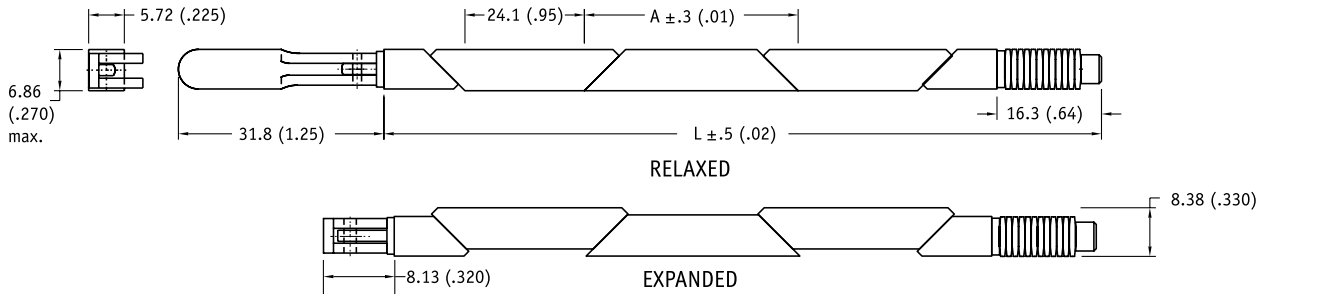
**Material:**  
Series 300 stainless steel per  
QQ-S-763 ASTM A-582

**Finish:**  
Passivate per Mil-S-5002

## WEIGHT

.103 oz./in. (1.22 g/cm)

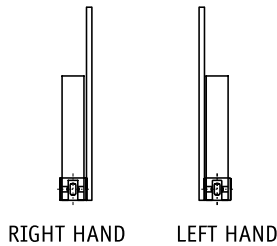
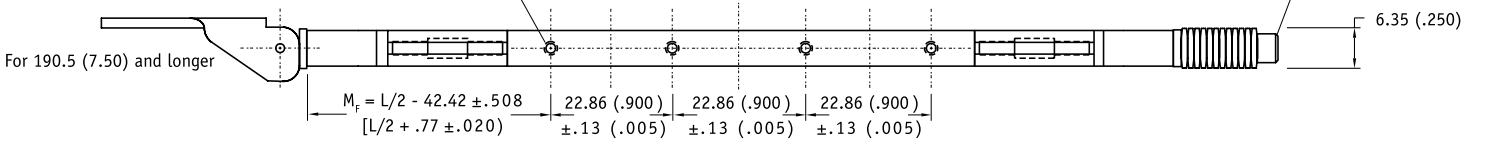




### MOUNTING HOLE LOCATION

22.86 (.900) hole spacing centered on mounting body

- 10 thru -13 2 holes
- 14 thru -24 4 holes



Units: mm(in)  
 unless specified otherwise,  
 .xx = ± .25, .x = ± .5  
 (.xxx = ±.010, .xx = ± .02)

**Part Number Code** (See example below)

**Series 146CR-5 WEDGE-LOK Five-piece Lever-actuated**

146CR-5    x    -x    -x    -x

**Mounting**  
 Select code letter from Mounting Method Table \_\_\_\_\_ 1

**Length**  
 Length in .500 (12.7) increments \_\_\_\_\_ 10 [5.00 (127.0)]  
 \_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**  
 Select code letter from Finish Table \_\_\_\_\_ 2

**Lever Action**  
 Left hand \_\_\_\_\_ L  
 Right hand \_\_\_\_\_ R

**Part Number Code example: 146CR-5M-12-C-R**  
 Series 146CR WEDGE-LOK Five piece Lever actuated 6.00-in. (152.4-mm) long, Chem Film, M2.5 screw mounted, right hand.

① MOUNTING METHOD	
Code Letter	Method
R	Rivet Mount (∅ 1.70 +.10/-.03 (.067 +.004/.001) THRU L∅ 3.96 (.156) ∩ 3.30 (.200) √∅ 3.56 (.140) x 100°)
A	No Mounting Holes
S	2-56 UNC-2B tapped hole
M	M2.5 X .45 tapped hole
M2	M2 X .40 tapped hole

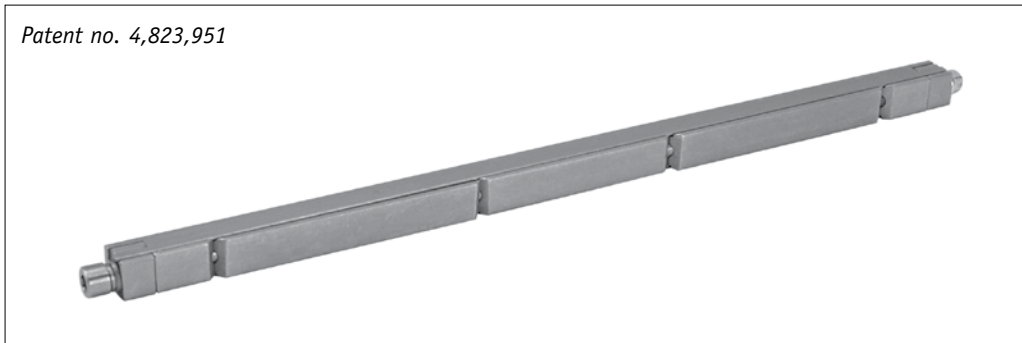
② FINISH TABLE	
Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

**FOR MECHANICAL AND THERMAL PERFORMANCE  
 SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	

Patent no. 4,823,951



**Series 48SL WEDGE-LOK**

- Also 47SL version available 5.72 (.225) x 5.72 (.225) call factory for details

## CHANNEL, WEDGES AND END PIECES

### Material:

Aluminum Alloy 6061-T6 per ASTM-B-221

### Finish:

See finish table on opposite page

## SCREW & WASHERS

.09-in. or 2.5-mm hex. socket head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 ASTM A-582

### Finish:

Passivate per Mil-S-5002 Type II

## OPTIONAL LOCK & FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

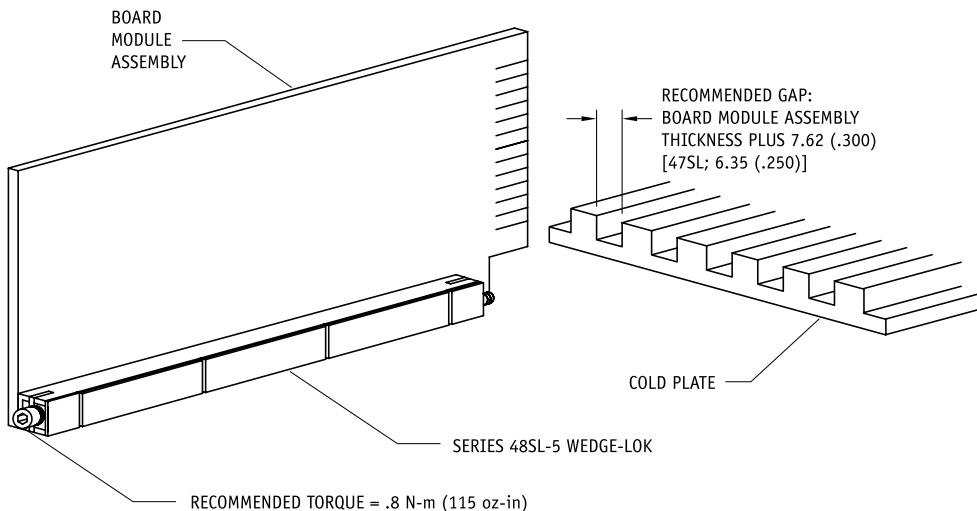
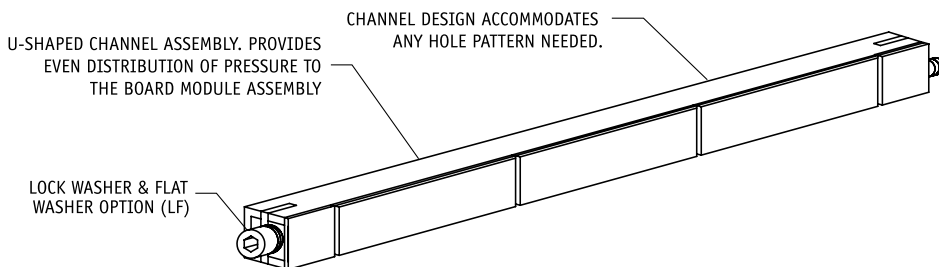
### Finish:

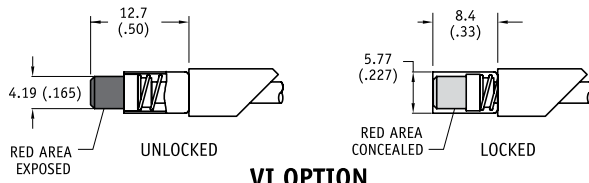
Passivate per Mil-S-5002

## WEIGHT

.115 oz./in. (1.28 g/cm)

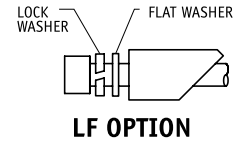
**DESIGNED FOR HEAVY SHOCK,  
VIBRATION, AND HEAT DISSIPATION**  
6.35 (.250) X 6.60 (.260) PROFILE





### VI OPTION

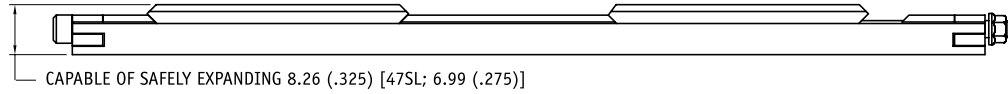
Indicates assembly is unlocked  
(adds 5.1 (.20) to screw length)



### LF OPTION

Provides additional resistance to shock and vibration  
(adds 2.5 (.10) to screw length)

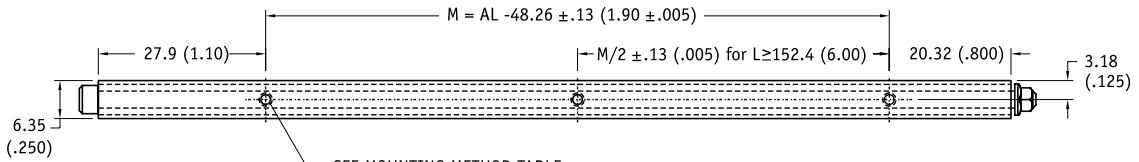
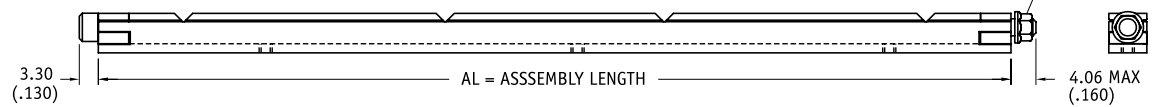
2.4 (.09) HEX HEAD SOCKET SCREW PER ANSI/ASME B18.3 2.5 mm SUPPLIED FOR METRIC MOUNTING



CAPABLE OF SAFELY EXPANDING 8.26 (.325) [47SL; 6.99 (.275)]

6.60 (.260) [47SL; 5.72 (.225)]

6.35 (.250) [47SL; 5.72 (.225)]



SEE MOUNTING METHOD TABLE

Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

**Part Number Code** (See example below)

**Series 48SL-5 WEDGE-LOK Five-piece**    48SL-5    x    x    -x    -x    -x

**Optional Visual Indicator**

Visual Indicator \_\_\_\_\_ **VI**

None \_\_\_\_\_ [**Blank**]

**Mounting**

Select code letter from Mounting Method Table \_\_\_\_\_ 1

**Length**

Length in .100 (2.54) increments \_\_\_\_\_ 48 [4.80 (121.9)]

\_\_\_\_\_ to 120 [12.00 (304.8)]

**Finish**

Select code letter from Finish Table \_\_\_\_\_ 2

**Washers**

Lock Washer and Flat Washer \_\_\_\_\_ **LF**

None \_\_\_\_\_ [**Blank**]

**Part Number Code example: 48SL-5S-48-C-LF**

Series 48SL-5 WEDGE-LOK Five-piece High Thermal Transfer, 2-56 screw mount, 4.80-in. (121.9-mm) long, chem film, with lock washer and flat washer

### 1 MOUNTING METHOD TABLE

DASH #	METHOD
A	No Mounting Holes
S	2-56 UNC-2B
T	0-80 UNF-2B
M	M2.5 X .45 tapped hole
M2	M2 X .40 tapped hole

### 2 FINISH TABLE

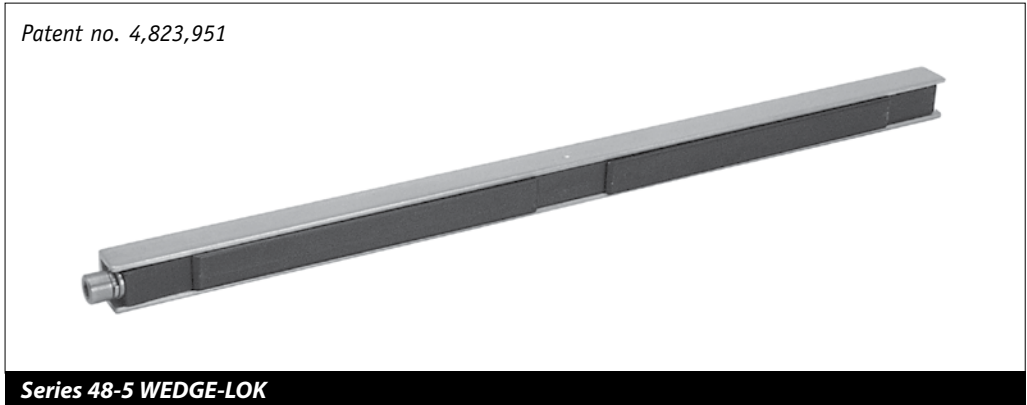
Code	Letter	Finish (see pg.11 for RoHS Compliance)
[blank]		Chemical Film per MIL-C-5541, Class 1a, Gold, non RoHS compliant
CC		Chemical Film per MIL-C-5541, Class 1A, Clear
EN		Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N		Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B		Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3		Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D		Hard Black Anodize with Dry Film Lube per MIL-L46010

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	

Patent no. 4,823,951



## HOUSING AND WEDGE

### Material:

Aluminum Alloy 6061-T6 per QQ-A-200/8

### Finish:

Chemical Film per Mil-C-5541, Class 1A

## WEDGES

### Material:

Aluminum Alloy 6061-T6 per QQ-A-200/8

### Finish:

Black Anodize per Mil-A-8625, Type II

## SCREW

.09-in. or 2.5-mm hex socket Head cap screw, depending on mounting configuration

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## ALIGNMENT SPRINGS

### Material:

Beryllium Copper per QQ-C-533

### Finish:

Nickel per QQ-N-290, Class 1, Grade G, Bright

## FLAT WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

### Finish:

Passivate per Mil-S-5002

## OPTIONAL LOCK WASHER

### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

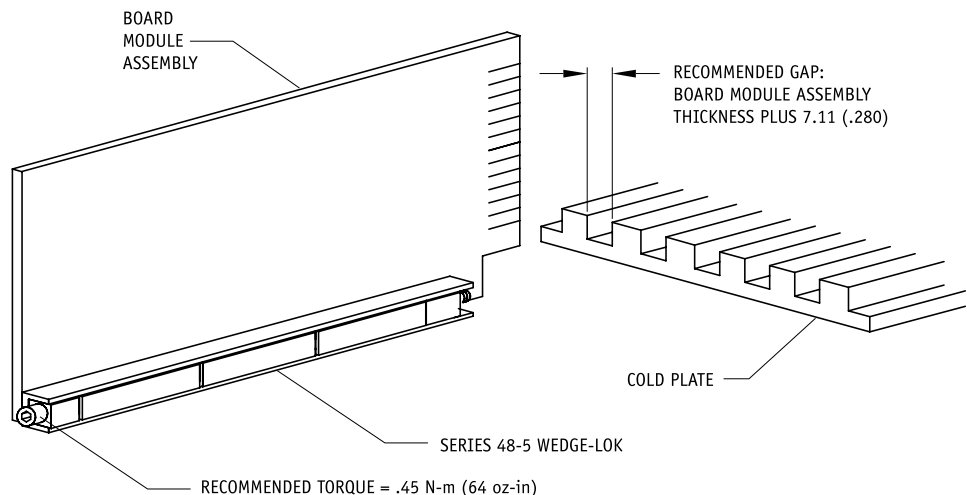
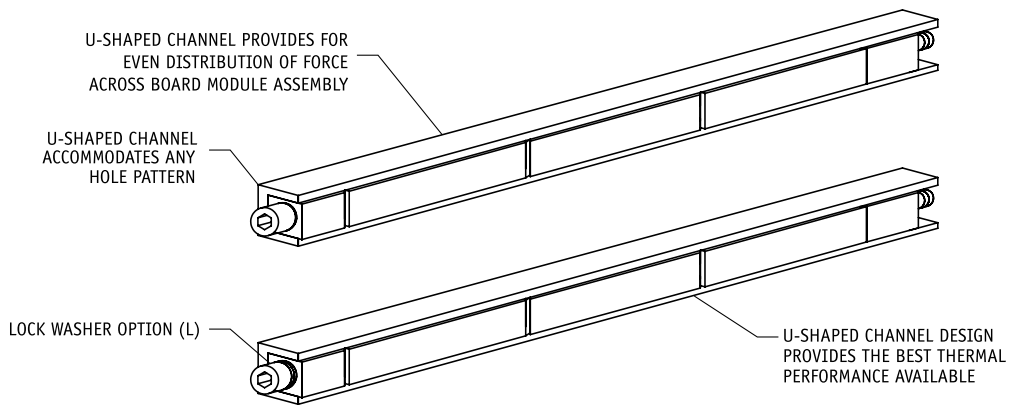
### Finish:

Passivate per Mil-S-5002

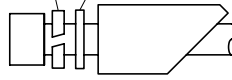
## WEIGHT

.120 oz./in. (1.42 g/cm)

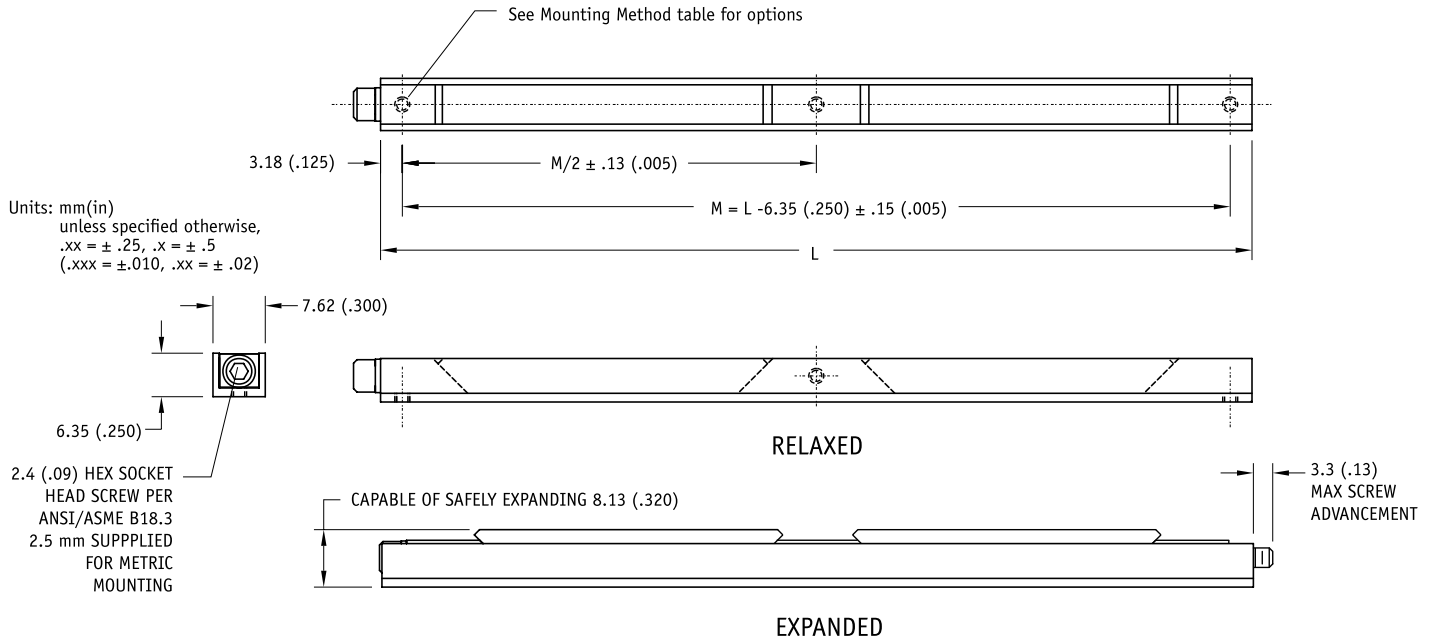
**DESIGNED FOR HEAVY SHOCK, VIBRATION, AND HEAT DISSIPATION**



LOCK WASHER OPTION  
FLAT WASHER INCLUDED WITH SERIES



### L OPTION



**Part Number Code** (See examples below)

**Series 48-5 WEDGE-LOK High Thermal Transfer**    48-5    -X    -X    -X    -X

**Mounting**  
Select Code Letter from Mounting Table \_\_\_\_\_ 1

**Length**  
Length in .500 (12.7) increments \_\_\_\_\_ 6 [3.00 (76.2)]  
\_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**  
Select code letter from Finish Table \_\_\_\_\_ 2

**Lock Washer**  
Lock Washer \_\_\_\_\_ L  
None \_\_\_\_\_ [Blank]

**Part Number Code example: 48-5S-12-L**

Series 48-5 WEDGE-LOK Five-piece High Thermal Transfer 6.00-in. (152.4-mm) long, with Lock Washer option, 2-56 mounting screws

### 1 MOUNTING METHOD TABLE

Code Letter	METHOD
A	No Mounting Holes
S	2-56 UNC-2B tapped hole
T	0-80 UNF-2B tapped hole
M	M2.5 X .45 tapped hole
M2	M2 X .40 tapped hole
P	Indexing pins $\varnothing 1.57 (.062) \times 1.02 (.040)$ (two pins only)

### 2 FINISH TABLE

Code Letter	Finish (see pg.11 for RoHS Compliance)
[blank]	Housing-Chem Film Gold; Wedges-Black Anodize
C	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
CC	Chemical Film per MIL-C-5541, Class 1A, Clear
EN	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
N	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
B	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
B3	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
B3D	Hard Black Anodize with Dry Film Lube per MIL-L46010

**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## APPLICATIONS

For military and commercial applications where harsh environments exist and where retainers are not mounted to the PCB modules. Ideal for conduction cooled chassis cold wall that do not provide a precision machined slot. There is a version "V" for use with VME64x or cPCI boards not designed with conduction frame or wedge clamps.

## FEATURES

### WEDGES & HOUSING

#### Material:

Aluminum Alloy  
6061-T6 per QQ-A-200/8

#### Finish:

See finish table on opposite page

#### SCREW

.09-in. or 2.5-mm hex. socket head cap screw, depending on mounting configuration

#### Material:

Series 300 stainless steel per QQ-S-763 and ASTM A-582

#### Finish:

Passivate per Mil-S-5002

### ALIGNMENT SPRINGS

#### Material:

Beryllium Copper QQ-C-533

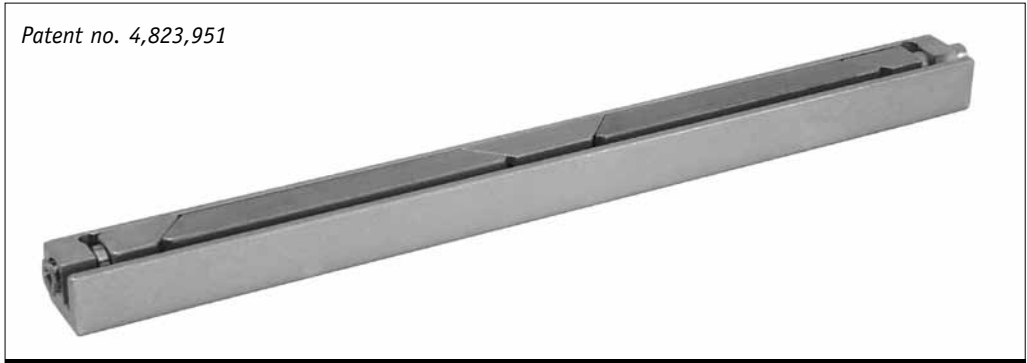
#### Finish:

Nickel QQ-N-290 Class I, Grade G, Bright

#### WEIGHT

.224 oz./in. (2.65 g/cm)

Patent no. 4,823,951

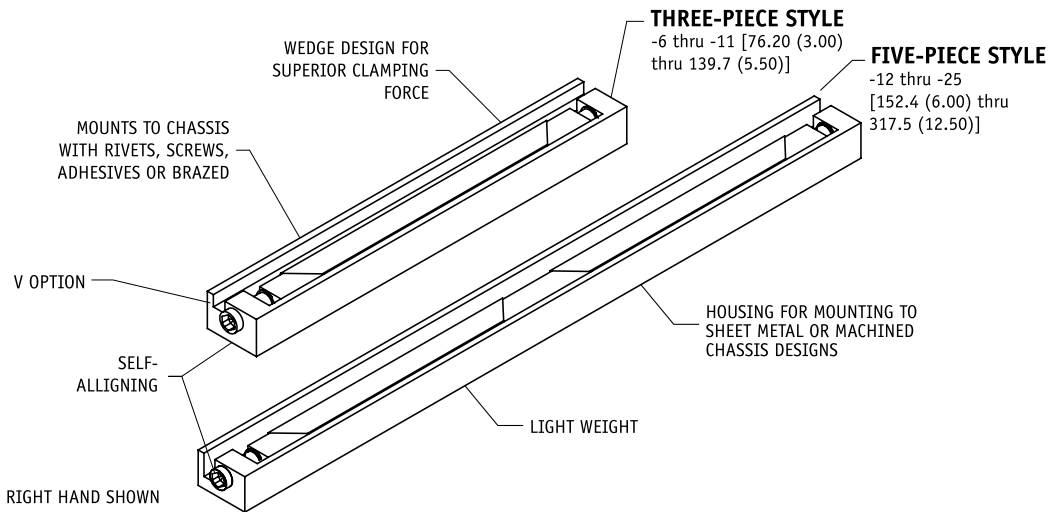


Series 340 WEDGE-TAINER

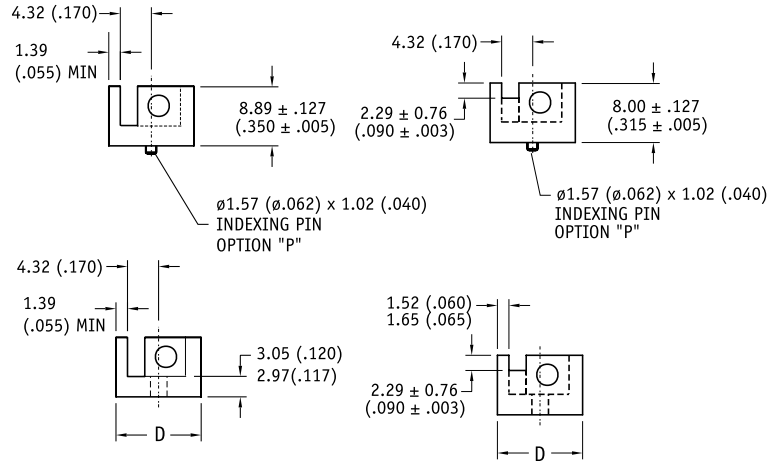
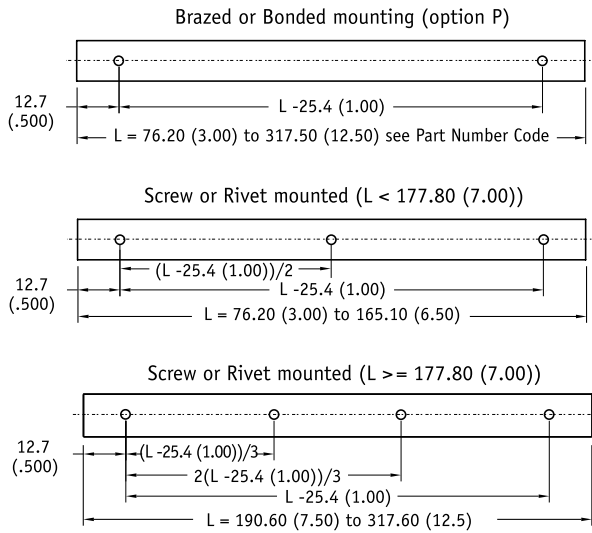


Series V340 WEDGE-TAINER

## DESIGNED FOR HEAVY SHOCK, VIBRATION, AND HEAT DISSIPATION



Recommended torque .8N-m (115oz-in)



Units: mm(in)  
 unless specified otherwise,  
 .xx ± .25, .x ± .5  
 (.xxx = ±.010, .xx = ± .02)

**V option**

**Part Number Code** (See example below)

**Series 340 & Series V340 WEDGE-TAINER**

V for eurocard style board like VME or cPCI \_\_\_\_\_ **V**  
 or not \_\_\_\_\_ **[Blank]**

**Screw Action**  
 Left hand \_\_\_\_\_ **L**  
 Right hand \_\_\_\_\_ **R**

**Board Thickness**  
 Select a dash number from Board Thickness Table \_\_\_\_\_ **1**

**Mounting Method**  
 Select code letter from Mounting Method Table \_\_\_\_\_ **2**

**Length**  
 Length in .500 (12.7) increments \_\_\_\_\_ **06** [3.00 (76.2)]  
 \_\_\_\_\_ to 25 [12.50 (317.5)]

**Finish**  
 Select code letter from Finish Table \_\_\_\_\_ **3**

**1 BOARD THICKNESS TABLE**

DASH #	THICKNESS ±.127 (.005)	D ±.127 (.005)
-100	1.52 (.060)-2.39 (.094)	12.19 (.480)
-150	2.79 (.95)-3.68 (.145)	13.46 (.530)
-175	3.30 (.130)-4.19 (.165)	13.46 (.530)

**2 MOUNTING METHOD TABLE**

Code Letter	Method
<b>R</b>	Rivet Holes (Ø2.48 (.098) THRU √ Ø4.55 (.179) x 100°)
<b>A</b>	No Mounting Holes
<b>P</b>	Indexing Pins Ø1.57 (.062) X 1.02 (.040) (Two pins only) Indexing pins (-P) and rivet (-R) parts are shipped unassembled. Housing is unplated and unmarked for Indexing Pins (-P) method.
<b>S</b>	4-40 UNC-2B tapped holes
<b>M</b>	M3 X .50 tapped holes

**3 FINISH TABLE**

Code Letter	Finish (see pg.11 for RoHS Compliance)
<b>[blank]</b>	Chemical Film per MIL-C-5541, Class 1A, Gold, non RoHS compliant
<b>CC</b>	Chemical Film per MIL-C-5541, Class 1A, Clear
<b>EN</b>	Electroless Nickel per MIL-C-26074, Class 4, Grade B, Bright
<b>N</b>	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright (.0002")
<b>B</b>	Black Anodize per MIL-A-8625, Type II, Class 2, (.00005" - .0003")
<b>B3</b>	Hard Black Anodize per MIL-A-8625, Type III, Class 2 (.002")
<b>B3D</b>	Hard Black Anodize with Dry Film Lube per MIL-L46010

**Part Number Code example: 340L-100M-12N**

Series 340 WEDGE-TAINER, left handed, for .060-.094-in. (1.52-2.39 mm) thick board, M3 metric screw mounting, 6.00-in. (152.4-mm) long, nickel plate finish.

**Part Number Code example: V340R-175P-10C**

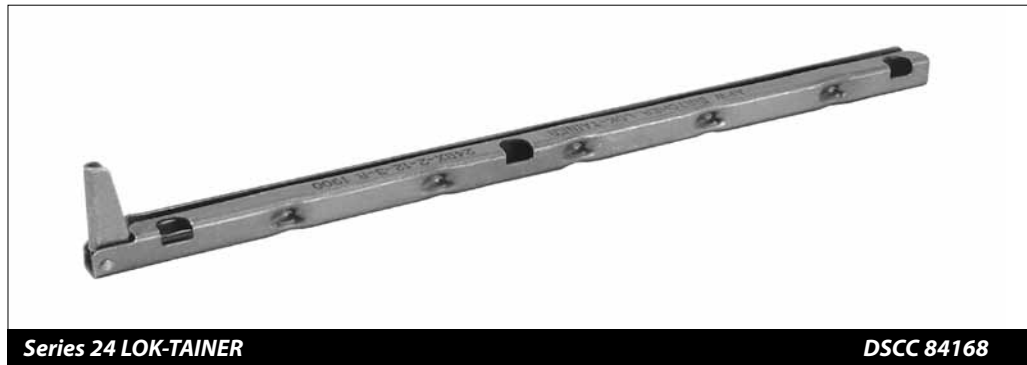
Series V340 WEDGE-TAINER VME/cPCI, right handed, for .130-.165-in. (3.30-4.19-mm) thick board, indexing pin mounting, 5.00-in. (127.0) long, Chem Film Gold finish.

**FOR MECHANICAL AND THERMAL PERFORMANCE  
 SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	---
Relative Price	

\*For mechanical and thermal performance data see the Technical Applications section pages 74-92



Series 24 LOK-TAINER

DSCC 84168

## MATERIAL

### HOUSING

.025-in. (.64-mm) thick  
Beryllium Copper per QQ-C-533 or  
.024-in. (.61-mm) thick Cold  
Rolled Steel per ASTM A-366

### CAM

Beryllium Copper  
per QQ-C-533

### LEVER

Cold Rolled Steel  
per ASTM A-366  
Note: Beryllium Copper  
lever furnished when  
housing is unplated

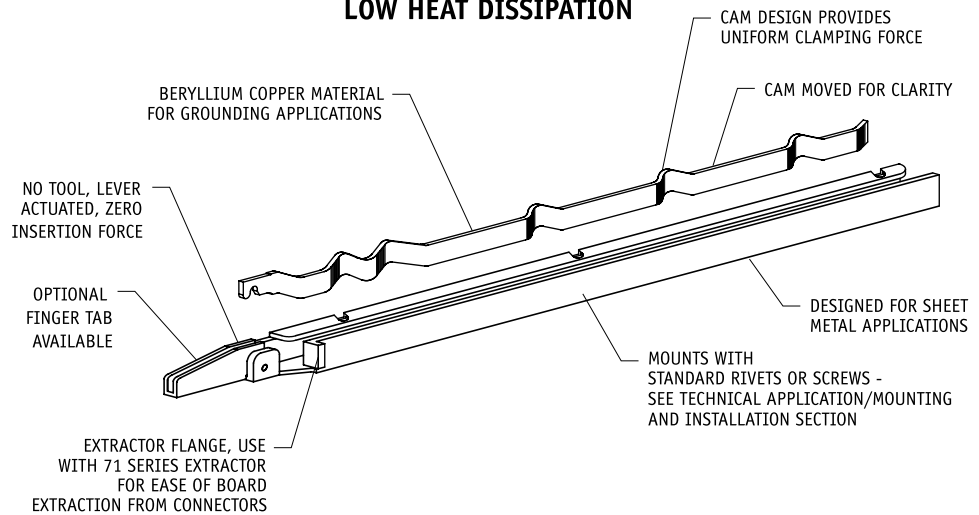
### FINISH

See finish table on  
opposite page

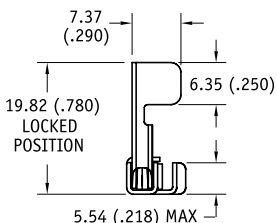
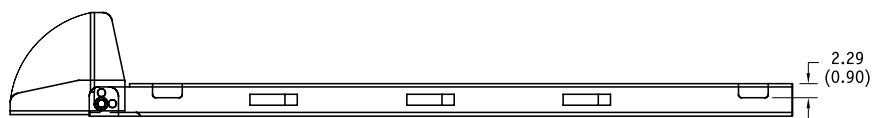
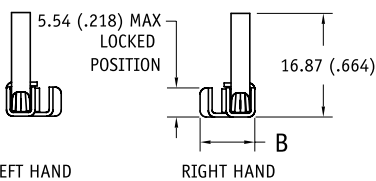
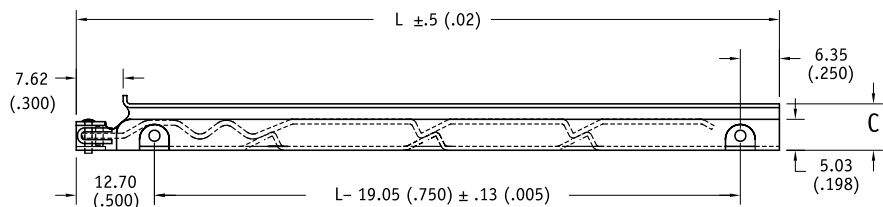
### WEIGHT

.087 oz./in.. (97 g/cm)

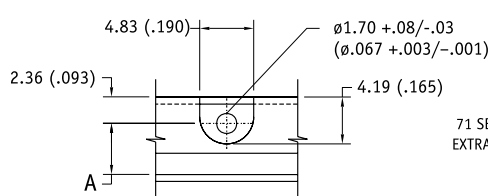
## MODERATE SHOCK & VIBRATION APPLICATIONS LOW HEAT DISSIPATION



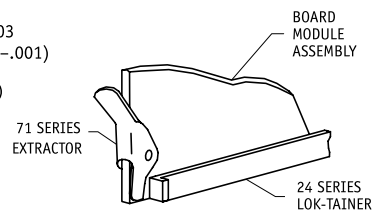
Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



FINGER TAB OPTION  
NOT TO SCALE - LEFT HAND SHOWN

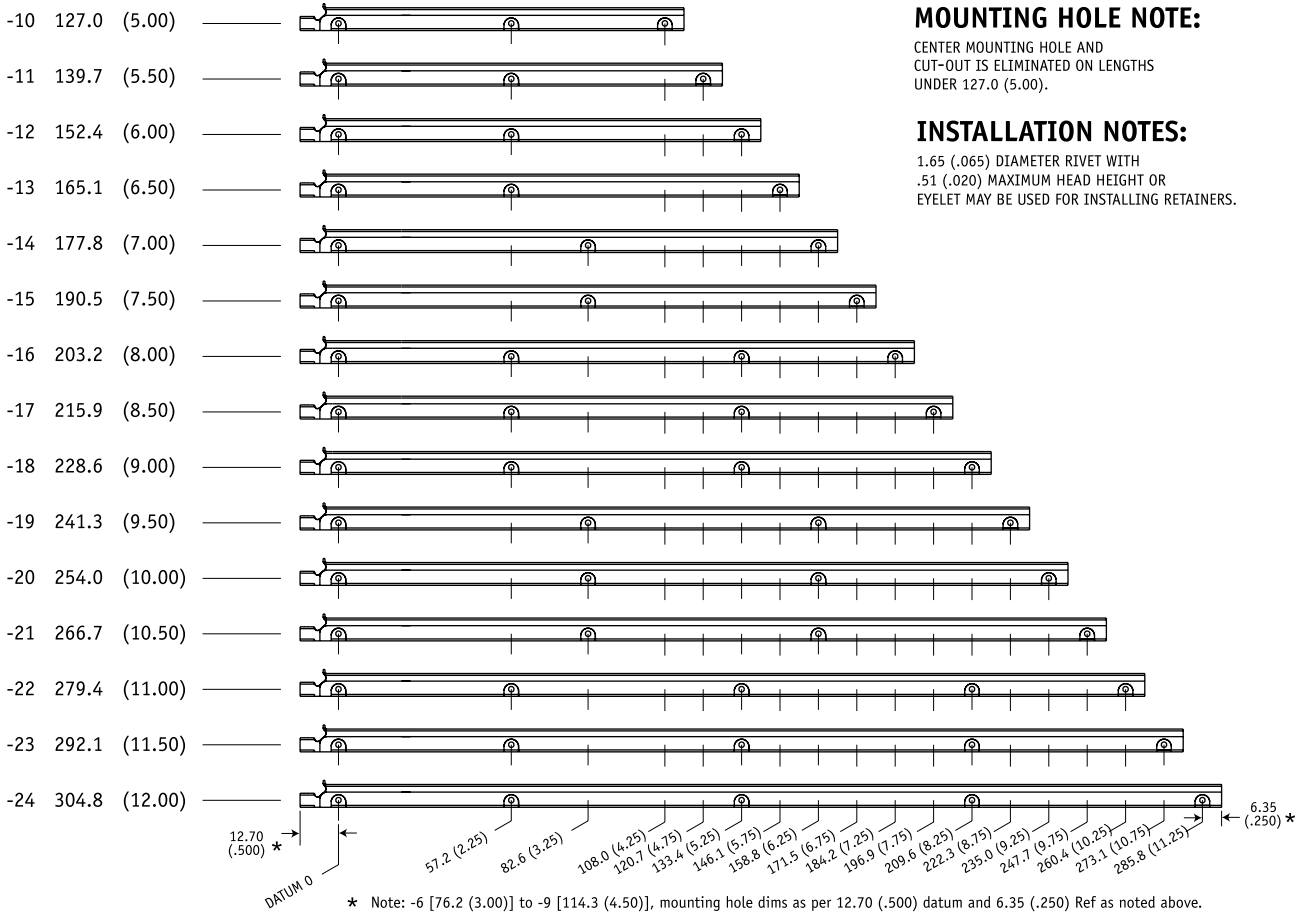


MOUNTING HOLE DETAIL  
NOT TO SCALE



71 SERIES EXTRACTOR  
OPTIONAL/NOT TO SCALE

**MOUNTING HOLE DIMENSIONS  
24 SERIES**



**Part Number Code**

Series 24 LOK-TAINER Lever Actuated      x 24 x x -x -x -x -x

**Finger Tab**  
Finger tab \_\_\_\_\_ T  
None \_\_\_\_\_ [Blank]

**Housing Material**  
Select from Materials Table \_\_\_\_\_ 1

**Extractor Flange**  
(Standard) \_\_\_\_\_ X  
None \_\_\_\_\_ [Blank]

**Board Thickness**  
Select dash number from Board Thickness Table \_\_\_\_\_ 2

**Length**  
Length in .500 (12.7) increments \_\_\_\_\_ 6 [3.00 (76.2)]  
\_\_\_\_\_ to 24 [12.00 (304.8)]

**Finish**  
Select dash number from Finish Table \_\_\_\_\_ 3

**Lever Action**  
Left hand \_\_\_\_\_ L  
Right hand \_\_\_\_\_ R

**1 MATERIALS TABLE**

Code Letter	Material
B	Beryllium Copper, 1/4H per, ASTM-B-194
S	Steel per, ASTM-A-366

**2 BOARD THICKNESS TABLE**

DASH #	THICKNESS + .127/- .000 + .005/- .000	THICKNESS		
		A	B	C
-1	0.79 (.031)	4.58 (.180)	8.89 (.350)	7.55 (.297)
-2	1.60 (.063)	4.58 (.180)	8.89 (.350)	7.55 (.297)
-3	2.39 (.094)	5.34 (.210)	9.66 (.380)	8.31 (.327)

**3 FINISH TABLE**

Contact Factory for other finishes

Dash #	Finish (see pg.11 for RoHS Compliance)
[blank]	Silver Plate per QQ-S-365, Type III, Grade A
-1	None
-2	Ebanol per MIL-F-495 for Beryllium Copper per MIL-C-13924 for Steel
-4	Copper Plate per MIL-C 14550, Class 2
-5	Gold Plate per MIL-G-45204, Type 1, Class 1
-6	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright
-7	Zinc Plate Clear Chromate, per ASTM-B-633, Fe/Zn 8
-8	Zinc Plate Yellow Chromate, per ASTM-B-633, Fe/Zn 8

NOTE: No finish (-1) not available with "S" Steel material

**Part Number Code example: 24BX-3-10-6-L**

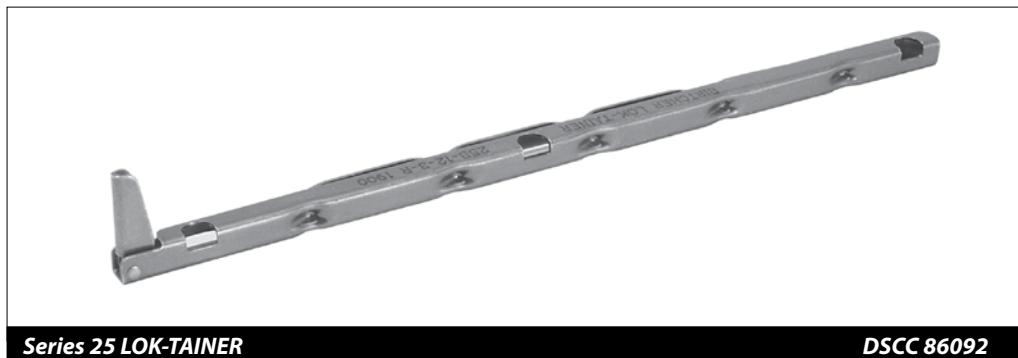
Series 24 Lever-actuated LOK-TAINER, Beryllium Copper housing with flange, .094-in. (2.39-mm) thick board, 5.00-in. (127.2-mm) long, Nickel plate finish and left hand lever action

**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	

\*For mechanical and thermal performance data see the Technical Applications section pages 74-92



Series 25 LOK-TAINER

DSCC 86092

## MATERIAL

### HOUSING

.025-in. (.64-mm) thick Beryllium Copper per QQ-C-533 or .024-in. (.61-mm) thick Cold Rolled Steel per ASTM A-366

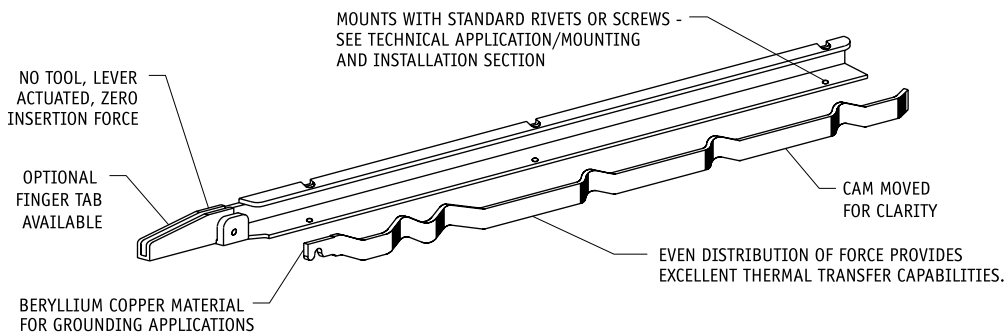
### CAM

Beryllium Copper per QQ-C-533

### LEVER

Cold Rolled Steel per ASTM A-366  
Note: Beryllium Copper lever furnished when housing is unplated.

## COLD WALL APPLICATIONS MODERATE THERMAL, SHOCK & VIBRATION APPLICATIONS

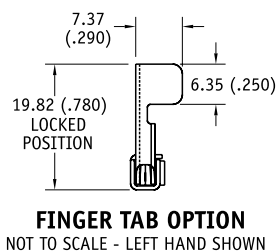
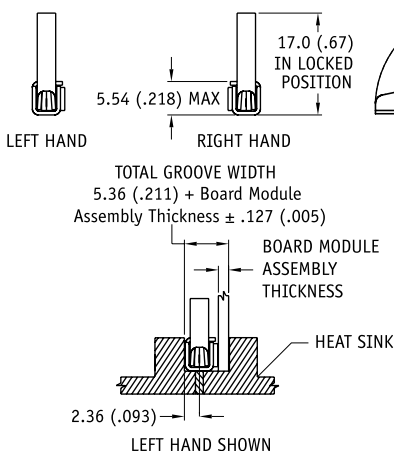
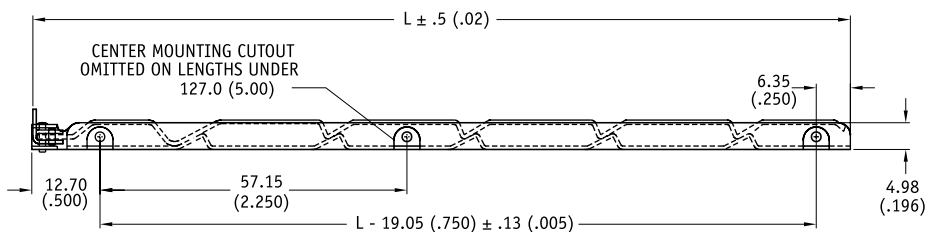
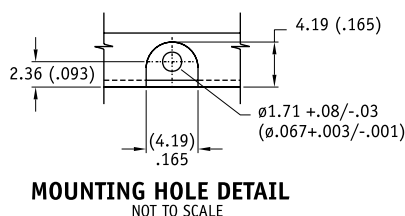


## FINISH

See finish table on opposite page

## WEIGHT

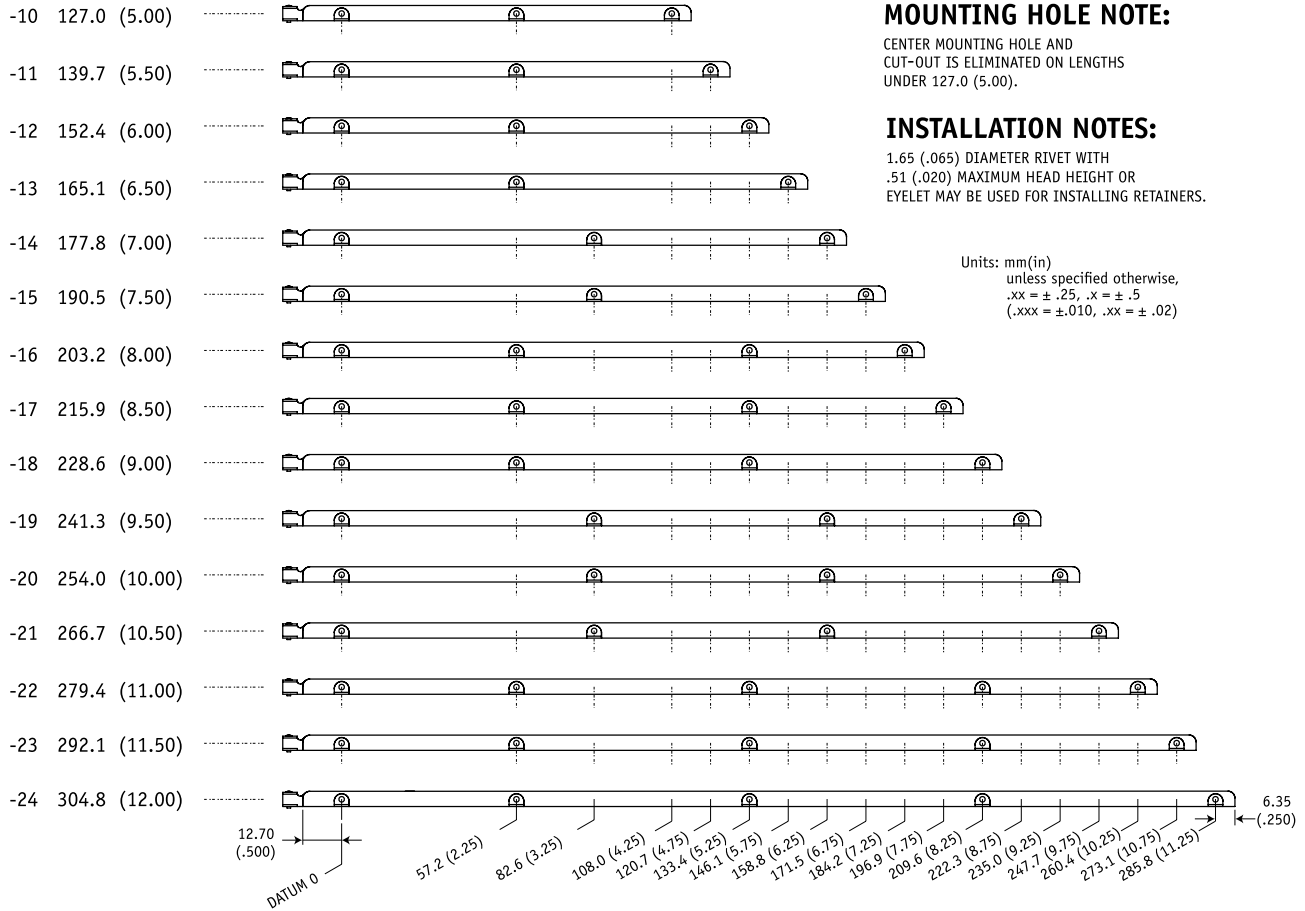
.087 oz./in. (.97 g/cm)



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ± 0.10, .xx = ± .02)

## MOUNTING HOLE DIMENSIONS

25 SERIES



### MOUNTING HOLE NOTE:

CENTER MOUNTING HOLE AND CUT-OUT IS ELIMINATED ON LENGTHS UNDER 127.0 (5.00).

### INSTALLATION NOTES:

1.65 (.065) DIAMETER RIVET WITH .51 (.020) MAXIMUM HEAD HEIGHT OR EYELET MAY BE USED FOR INSTALLING RETAINERS.

Note: -6 [76.2 (3.00)] to -9 [114.3 (4.50)], mounting hole dims as per 12.70 (.500) datum and 6.35 (.250) Ref as noted above.

### Part Number Code

Series 25 LOK-TAINER Lever Actuated

#### Finger Tab

Finger tab \_\_\_\_\_ T  
 None \_\_\_\_\_ [Blank]

#### Housing Material

Select from Materials Table \_\_\_\_\_ 1

#### Length

Length in .500 (12.7) increments \_\_\_\_\_ 6 [3.00 (76.2)]  
 \_\_\_\_\_ to 24 [12.00 (304.8)]

#### Finish

Select dash number from Finish Table \_\_\_\_\_ 2

#### Lever Action

Left hand \_\_\_\_\_ L  
 Right hand \_\_\_\_\_ R

### Part Number Code example: T25B-12-4-L

Series 25 Lever Actuated LOK-TAINER, with Finger Tab option, Beryllium Copper housing, 6.00-in. (152.4-mm) long, copper plate finish, and left hand lever action.

### 1 MATERIALS TABLE

Code Letter	Material
B	Beryllium Copper, 1/4H per, ASTM-B-194
S	Steel per, ASTM-A-366

### 2 FINISH TABLE

Contact Factory for other finishes

Dash #	Finish (see pg.11 for RoHS Compliance)
[blank]	Silver Plate per QQ-S-365, Type III, Grade A
-1	None
-2	Ebanol per MIL-F-495 for Beryllium Copper per MIL-C-13924 for Steel
-4	Copper Plate per MIL-C 14550, Class 2
-5	Gold Plate per MIL-G-45204, Type 1, Class 1
-6	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright
-7	Zinc Plate Clear Chromate, per ASTM-B-633, Fe/Zn 8
-8	Zinc Plate Yellow Chromate, per ASTM-B-633, Fe/Zn 8

NOTE: No finish (-1) not available with "S" Steel material

**FOR MECHANICAL AND THERMAL PERFORMANCE  
 SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	--
Relative Price	
*For mechanical and thermal performance data see the Technical Applications section pages 74-92	



## MATERIAL

### HOUSING

.025-in. (.64-mm) thick  
Beryllium Copper per QQ-C-533

### CAM

Beryllium Copper  
per QQ-C-533

### SCREW

Stainless Steel,  
Passivate Finish

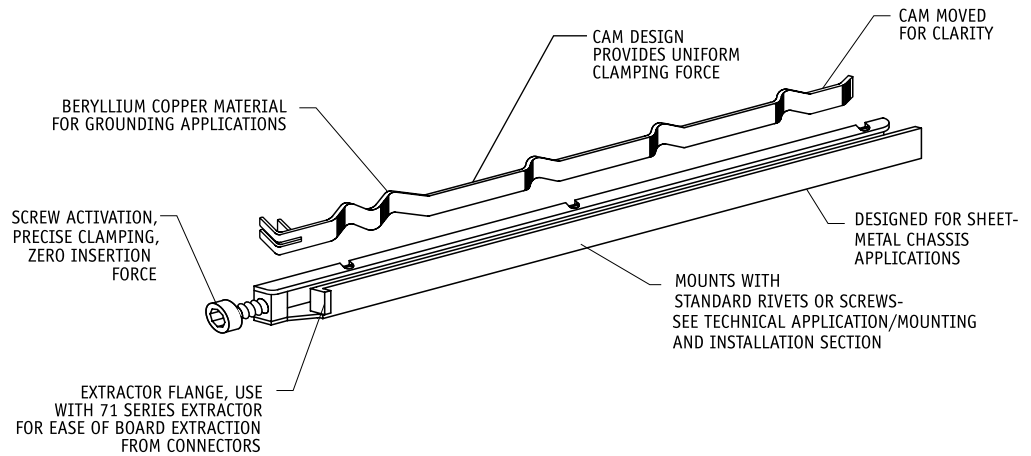
### FINISH

See finish table on  
opposite page

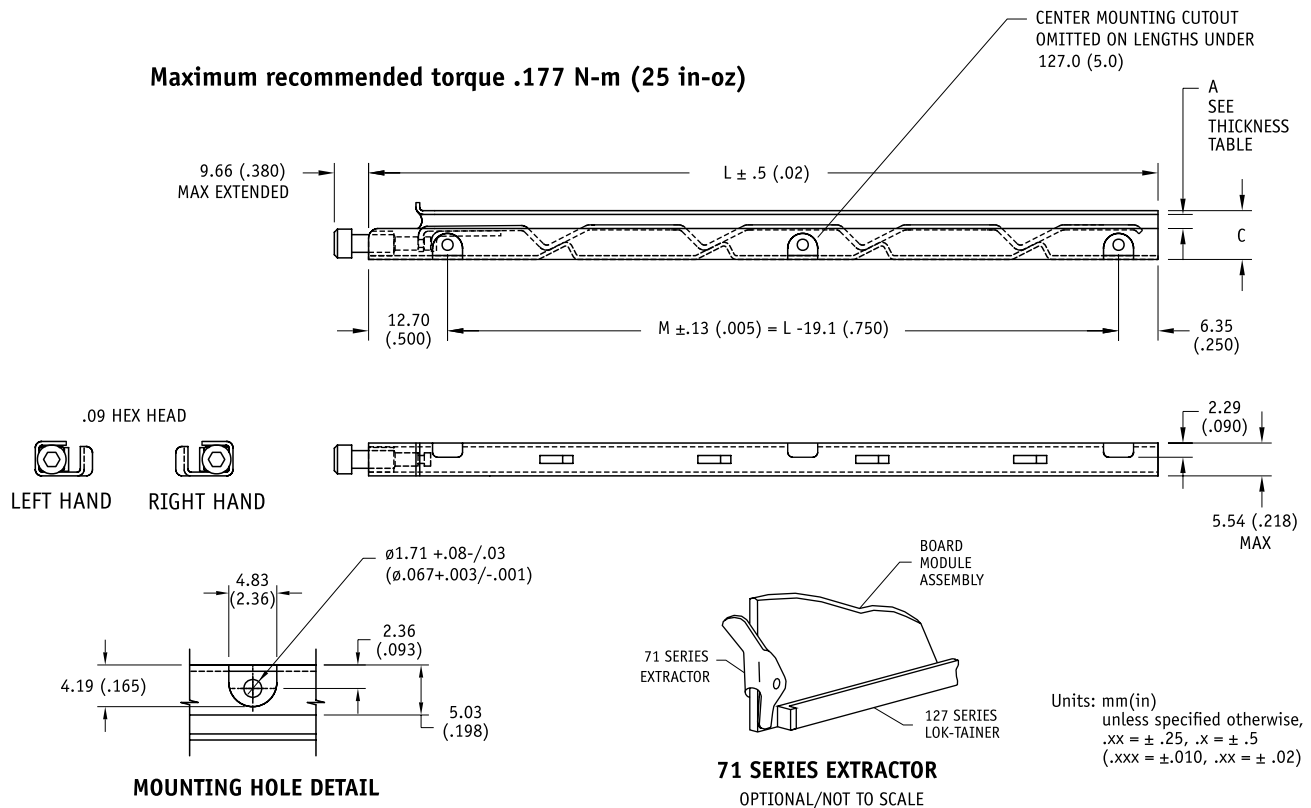
### WEIGHT

.116 oz./in. (1.29 g/cm)

## MODERATE SHOCK & VIBRATION APPLICATIONS LOW HEAT DISSIPATION



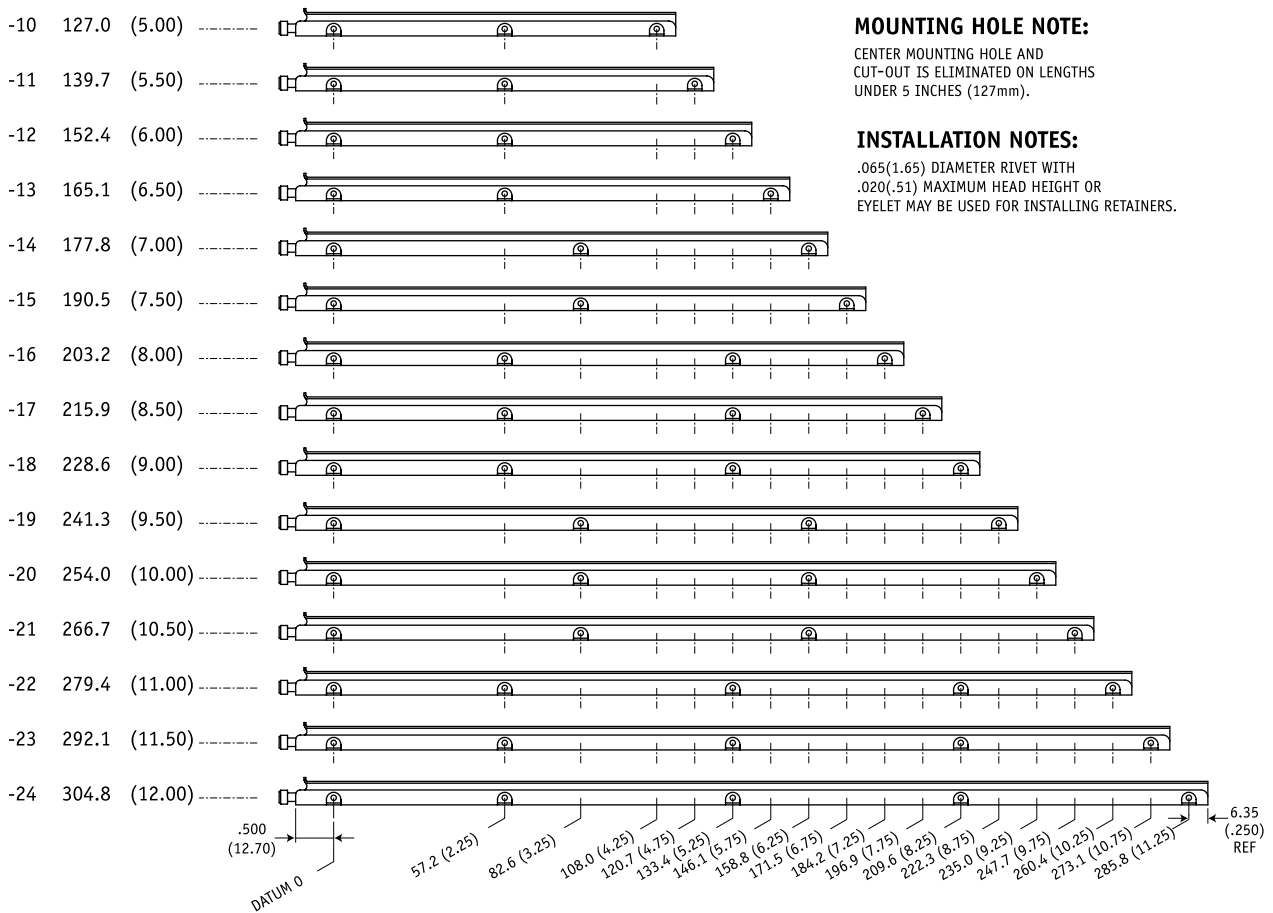
### Maximum recommended torque .177 N-m (25 in-oz)



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

**71 SERIES EXTRACTOR**  
OPTIONAL/NOT TO SCALE

**MOUNTING HOLE DIMENSIONS**  
127 SERIES



**MOUNTING HOLE NOTE:**  
CENTER MOUNTING HOLE AND CUT-OUT IS ELIMINATED ON LENGTHS UNDER 5 INCHES (127mm).

**INSTALLATION NOTES:**  
.065 (1.65) DIAMETER RIVET WITH .020 (.51) MAXIMUM HEAD HEIGHT OR EYELET MAY BE USED FOR INSTALLING RETAINERS.

Note: -6 [76.2 (3.00)] to -9 [114.3 (4.50)], mounting hole dims as per 12.70 (.500) datum and 6.35 (.250) Ref as noted above.

<b>Part Number Code</b>	
Series 127 LOK-TAINER Screw-Actuated	127 x -x -x -x
<b>Housing Material</b>	Select from Materials Table _____ 1
<b>Board Thickness</b>	Select dash number from Board Thickness Table _____ 2
<b>Length</b>	Length in .500 (12.7) increments _____ 6 [3.00 (76.2)] to 24 [12.00 (304.8)]
<b>Finish</b>	Select dash number from Finish Table _____ 3
<b>Screw Action</b>	Left hand _____ L Right hand _____ R

**Part Number Code example: 127B-4-12-6-R**

Series 127 Screw-actuated LOK-TAINER, Beryllium Copper housing with flange, 6.00-in. (152.4-mm) long, Nickel plate finish, and right hand screw action.

**1 MATERIALS TABLE**

Code Letter	Material
B	Beryllium Copper, 1/4H per, ASTM-B-194
S	Steel per, ASTM-A-366

**2 BOARD THICKNESS TABLE**

Dash #	A		C
	Min	Max	
-2	.025 (0.64)	.070 (1.78)	.309 (7.85)
-4	.087 (2.21)	.132 (3.36)	.376 (9.55)

**3 FINISH TABLE**

Dash #	Finish (see pg.11 for RoHS Compliance)
Contact Factory for other finishes	
<b>NOTE</b>	Silver Plate per QQ-S-365, Type III, Grade A
-1	None
-2	Ebanol per MIL-F-495 for Beryllium Copper per MIL-C-13924 for Steel
-4	Copper Plate per MIL-C 14550, Class 2
-5	Gold Plate per MIL-G-45204, Type 1, Class 1
-6	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright
-7	Zinc Plate Clear Chromate, per ASTM-B-633, Fe/Zn 8
-8	Zinc Plate Yellow Chromate, per ASTM-B-633, Fe/Zn 8

NOTE: No finish (-1) not available with "S" Steel material

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

Relative Clamping Force*	
Relative Retention Force*	
Relative Thermal Resistance*	
Relative Price	

\*For mechanical and thermal performance data see the Technical Applications section pages 74-92

## MATERIAL

### HOUSING

.025-in. (.64-mm) thick Beryllium Copper per QQ-C-533 or .024-in. (.61-mm) thick Cold Rolled Steel per ASTM A-366

### CAM

Beryllium Copper per QQ-C-533

### SCREW

Stainless Steel, Passivate Finish

### FINISH

See finish table on opposite page

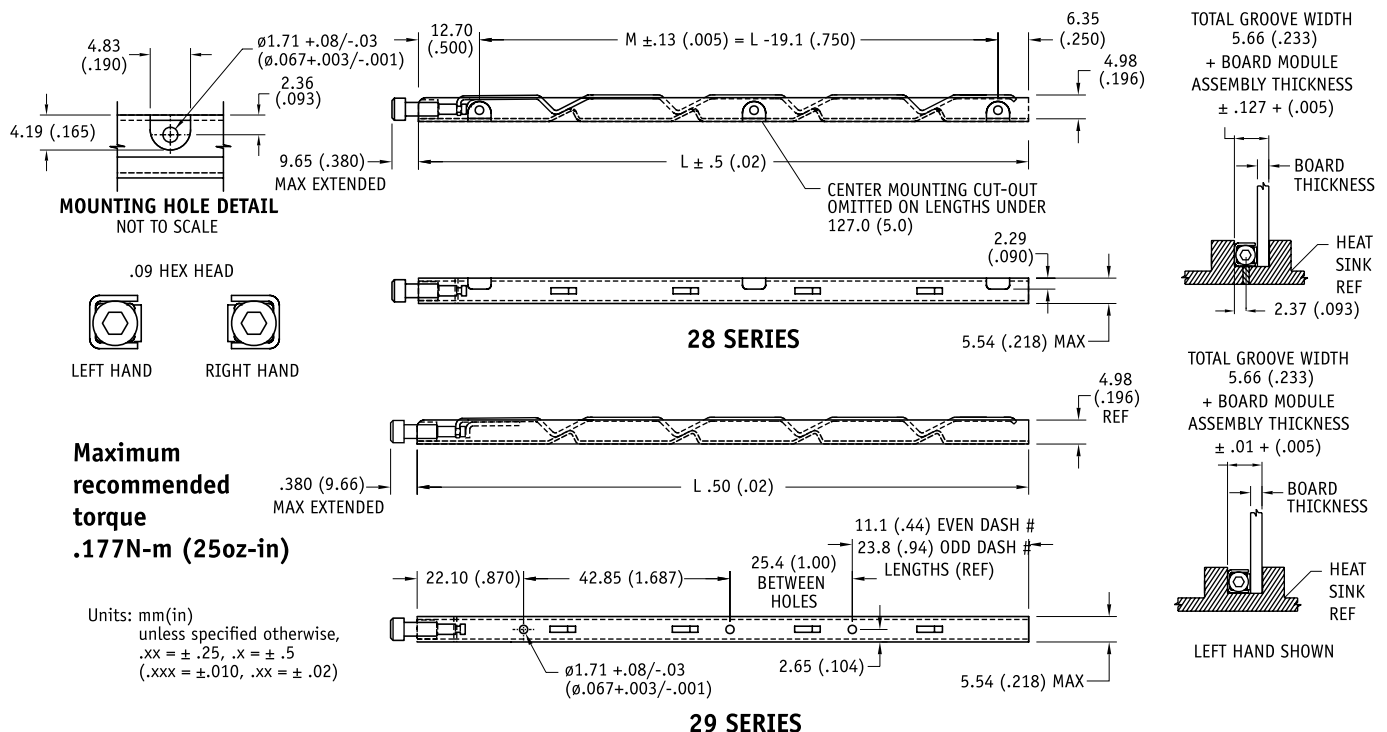
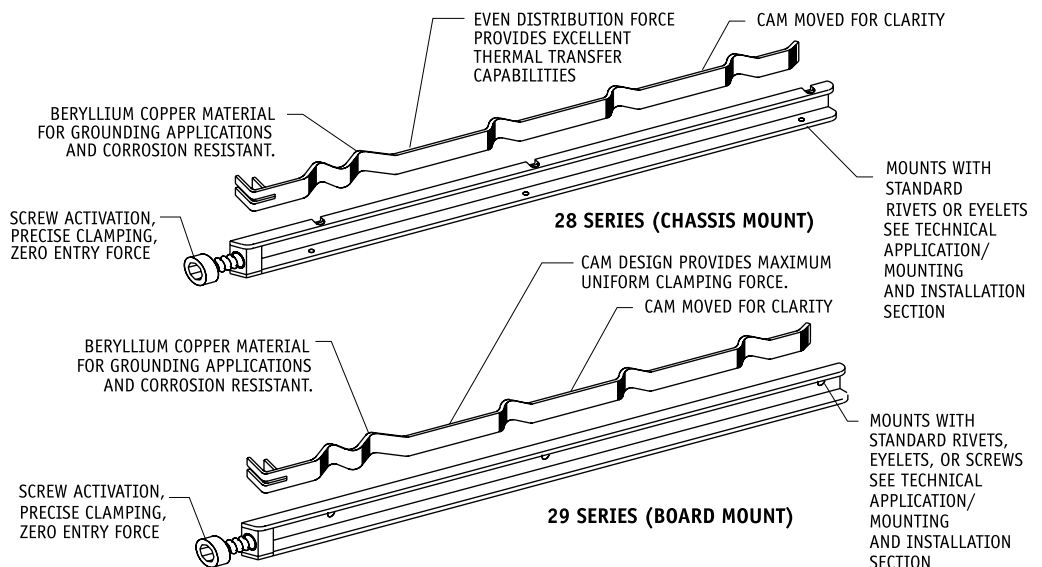
### WEIGHT

.087 oz./in. (.97 g/cm)

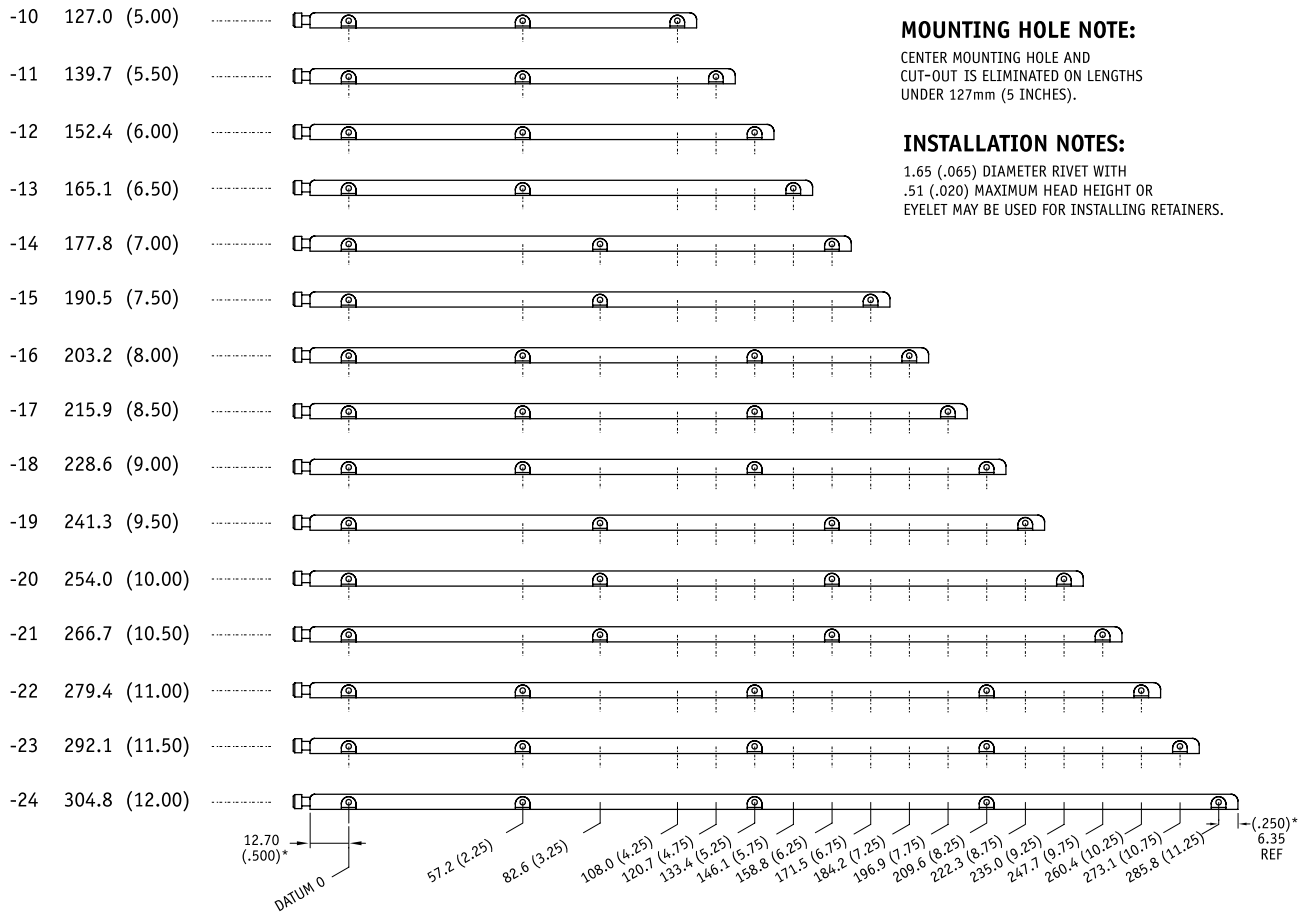


Series 28 & 29 LOK-TAINER

## SHOCK & VIBRATION APPLICATIONS MODERATE HEAT DISSIPATION



## MOUNTING HOLE DIMENSIONS 28 SERIES



### MOUNTING HOLE NOTE:

CENTER MOUNTING HOLE AND CUT-OUT IS ELIMINATED ON LENGTHS UNDER 127mm (5 INCHES).

### INSTALLATION NOTES:

1.65 (.065) DIAMETER RIVET WITH .51 (.020) MAXIMUM HEAD HEIGHT OR EYELET MAY BE USED FOR INSTALLING RETAINERS.

\*NOTE: -6 (3.00 INCHES) THRU -9 (4.50 INCHES) MOUNTING HOLE DIMS AS PER 12.70 (.500) DATUM AND 6.35 (.250) REF AS NOTED ABOVE.

### Part Number Code

Series 28 & 29 LOK-TAINER Screw-Actuated **28 or 29** **X** **-X** **-X** **-X**

### Housing Material

Select from Materials Table \_\_\_\_\_ 1

### Length

Length in .500 (12.7) increments \_\_\_\_\_ 6 [3.00 (76.2)]  
to 24 [12.00 (304.8)]

### Finish

Select dash number from Finish Table \_\_\_\_\_ 2

### Screw Action (Series 28 only)

Left hand \_\_\_\_\_ **L**  
Right hand \_\_\_\_\_ **R**

### Part Number Code examples:

#### 28B-16-7-L

Series 28 Screw-actuated LOK-TAINER, Beryllium Copper housing, 8.00-in. (203.2-mm) long, Clear Zinc plated, with left hand screw action

#### 29B-12-6

Series 29 Screw-actuated LOK-TAINER, Beryllium Copper housing, 6.00-in. (152.4-mm) long, Nickel plate finish

### 1 MATERIALS TABLE

Code Letter	Material
<b>B</b>	Beryllium Copper, 1/4H per, ASTM-B-194
<b>S</b>	Steel per, ASTM-A-366

### 2 FINISH TABLE

Contact Factory for other finishes

Dash #	Finish (see pg.11 for RoHS Compliance)
<b>NONE</b>	Silver Plate per QQ-S-365, Type III, Grade A
<b>-1</b>	None
<b>-2</b>	Ebanol per MIL-F-495 for Beryllium Copper per MIL-C-13924 for Steel
<b>-4</b>	Copper Plate per MIL-C 14550, Class 2
<b>-5</b>	Gold Plate per MIL-G-45204, Type 1, Class 1
<b>-6</b>	Nickel Plate per QQ-N-290, Class 1, Grade G, Bright
<b>-7</b>	Zinc Plate Clear Chromate, per ASTM-B-633, Fe/Zn 8
<b>-8</b>	Zinc Plate Yellow Chromate, per ASTM-B-633, Fe/Zn 8

NOTE: No finish (-1) not available with "S" Steel material

**FOR MECHANICAL AND THERMAL PERFORMANCE  
SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## FEATURES

- Flared entry
- Choice of three materials
- Choice of 6 finishes or no finish
- Screw, rivet, eyelet or adhesive mounting
- Spring design to retain board module assembly
- Wide entrance for easy card insertion

## APPLICATIONS

- Designed for moderate shock and vibration environments
- Electrically conductive
- Ideal for applications with low heat dissipation

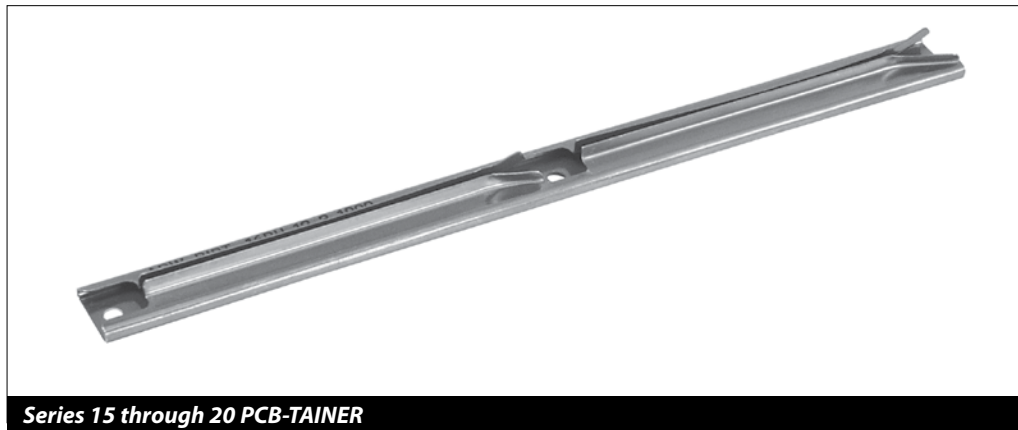
Series 15 & 17 for .063-in. (1.59-mm) boards  
 Series 16 & 18 for .094-in. (2.38-mm) boards  
 Series 19 & 20 for .125-in. (3.18-mm) boards

## MATERIAL

.010-in. (.25-mm) Beryllium Copper per ASTM B-194 or Stainless Steel per Mil-S-5059

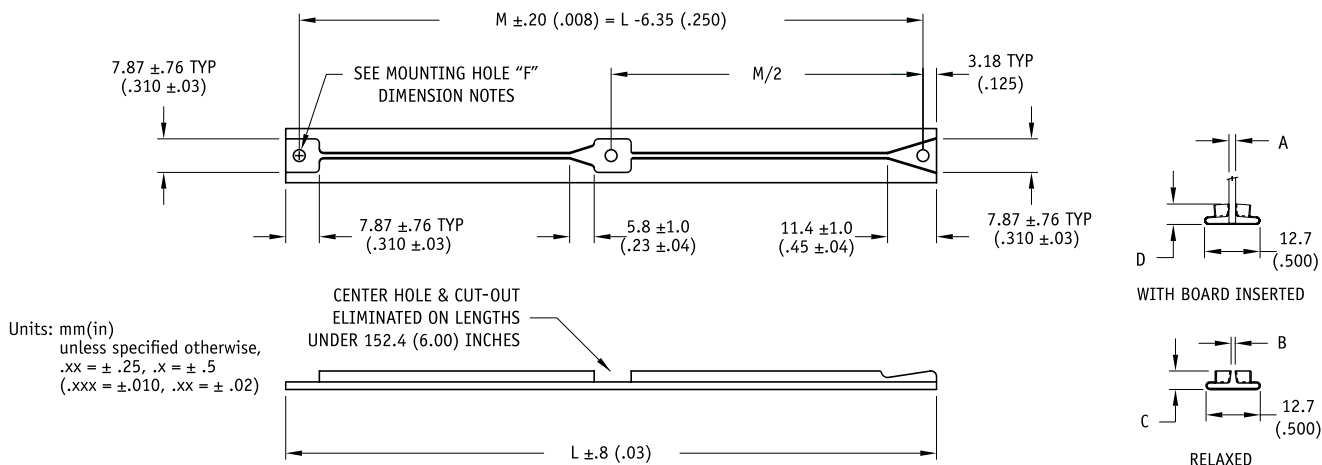
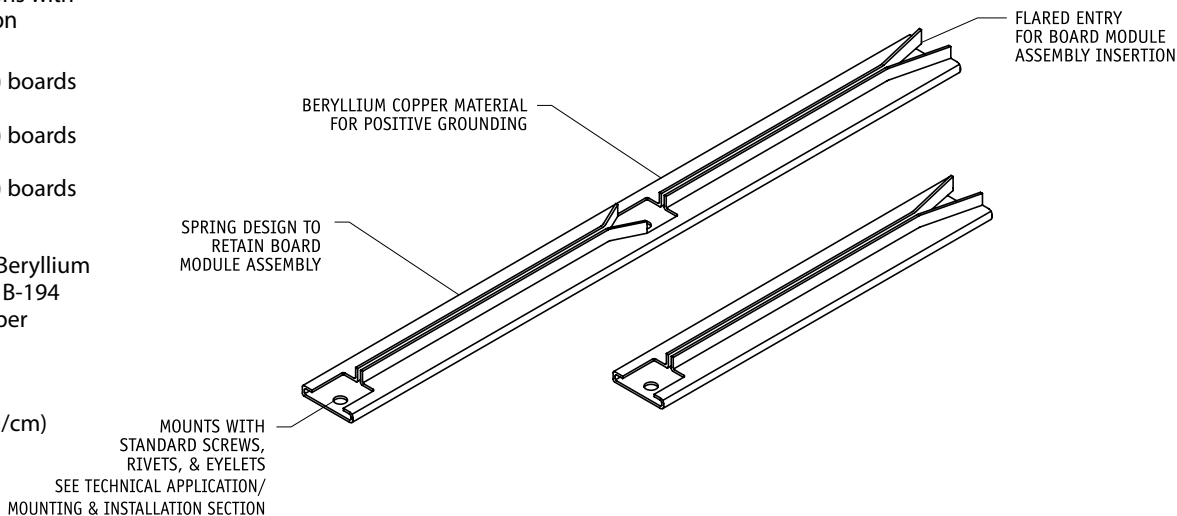
## WEIGHT

.056 oz./in. (0.63 g/cm)  
 Either material



Series 15 through 20 PCB-TAINER

## SHOCK & VIBRATION APPLICATIONS LOW HEAT DISSIPATION



## 1 MATERIALS TABLE

CODE LETTER	MATERIAL
<b>B</b>	BERYLLIUM COPPER, 1/4H PER, ASTM-B-194
<b>BH</b>	BERYLLIUM COPPER, 1/4 HT PER QQ-C-533, HEAT TREATED
<b>CR</b>	STAINLESS STEEL, TYPE 301 COND 1/4 H PER AMS 5517

## 2 FINISH TABLE

CONTACT FACTORY FOR OTHER FINISHES	
DASH #	FINISH (see pg.11 for RoHS Compliance)
[blank]	SILVER PLATE PER QQ-S-365, TYPE III, GRADE A
-1	NONE
-4	COPPER PLATE PER MIL-C-14550, CLASS 2
-5	GOLD PLATE PER MIL-G-45204, TYPE 1, CLASS 1
-6	NICKEL PLATE PER QQ-N-290, CLASS 1, GRADE G, BRIGHT
-7	ZINC PLATE CLEAR CHROMATE, PER ASTM-B-633, Fe/Zn 8
-8	ZINC PLATE YELLOW CHROMATE, PER ASTM-B-633 Fe/Zn 8

## DIMENSION NOTES

MOUNTING HOLE	
<b>SERIES 15, 16, &amp; 19</b>	$\varnothing 2.77 +.03 \setminus -.08$ $(\varnothing .109 +.001 \setminus -.003)$
<b>SERIES 17, 18, &amp; 20</b>	$\varnothing 2.49 +.03 \setminus -.08$ $(\varnothing .098 +.001 \setminus -.003)$

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

## DIMENSION TABLE

SERIES #	A	B	C	D	D	F
	BOARD THICKNESS			BERYLLIUM COPPER +.25 \setminus -.51 (+.010 \setminus .020)	STAINLESS STEEL .51 (.020)	MOUNTING HOLE +.03 \setminus -.08 (.001 \setminus -.003)
15	1.59 (.063)	0.97 (.038)	4.35 (.171)	4.83 (.190)	4.83 (.190)	2.77 (.109)
16	2.38 (.094)	1.73 (.068)	4.35 (.171)	4.83 (.190)	4.83 (.190)	2.77 (.109)
17	1.59 (.063)	0.97 (.038)	4.35 (.171)	4.83 (.190)	4.83 (.190)	2.49 (.098)
18	2.38 (.094)	1.73 (.068)	4.35 (.171)	4.83 (.190)	4.83 (.190)	2.49 (.098)
19	3.18 (.125)	2.54 (.100)	5.47 (.215)	6.35 (.250)	6.35 (.250)	2.77 (.109)
20	3.18 (.125)	2.54 (.100)	5.47 (.215)	6.35 (.250)	6.35 (.250)	2.49 (.098)

### Part Number Code

#### Series 15, 16, 17, 18, 19, and 20 PCB-TAINER

#### Series

Enter Series number \_\_\_\_\_ **15, 16, 17, 18, 19, or 20**

#### Material

Select Code Letter from Materials Table \_\_\_\_\_ **1**

#### Length

Length in .500 (12.7) increments \_\_\_\_\_ **4** [2.00 (50.8)]  
to 20 [10.00 (254.0)]

#### Finish

Select dash number from Finish Table \_\_\_\_\_ **2**

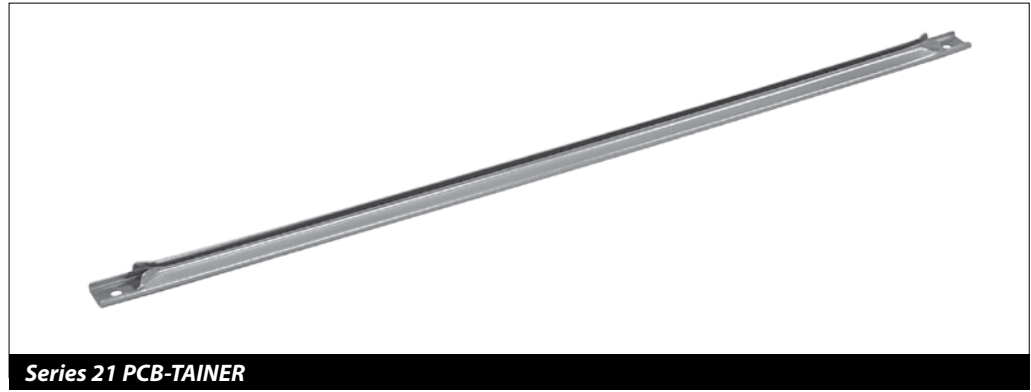
No dash number required for CR material. Stainless steel parts are passivated only.

### Part Number Code example: 15B-18-6

15 Series PCB-TAINER, Beryllium Copper, for .063-in. (1.59-mm) thick board, 9.00-in. (228.7-mm) long, Nickel Plate finish.

**FEATURES**

- Narrow profile
- Flared entry
- Choice of two materials
- Choice of six finishes or no finish
- Screw, rivet, eyelet or adhesive mounting
- Spring design to retain board module assembly
- Wide entrance for easy card insertion
- Narrow .125 (3.18) x .190 (4.83) profile



**APPLICATIONS**

- Designed for moderate shock and vibration environments
- Electrically conductive
- Ideal for applications with low heat dissipation

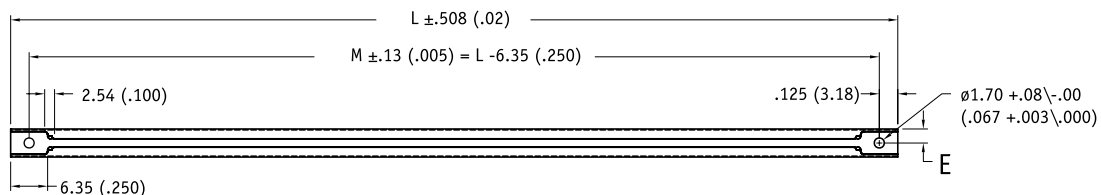
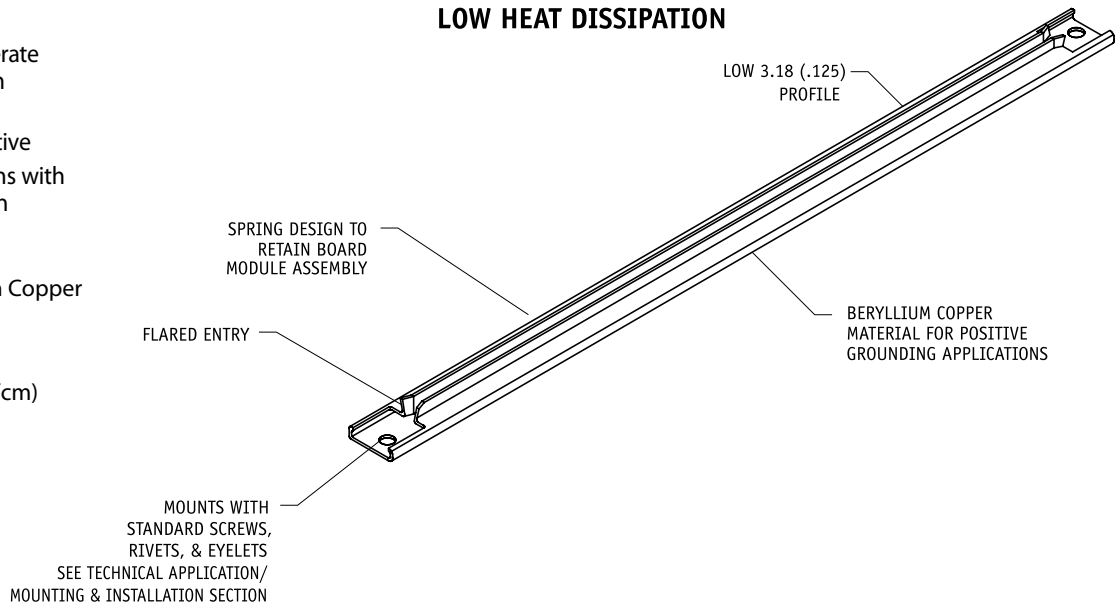
**MATERIAL**

.15 (.006) Beryllium Copper per ASTM B-194

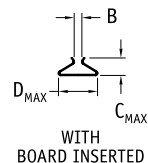
**WEIGHT**

.012 oz./in. (0.14 g/cm)  
Either material

**SHOCK & VIBRATION APPLICATIONS  
LOW HEAT DISSIPATION**



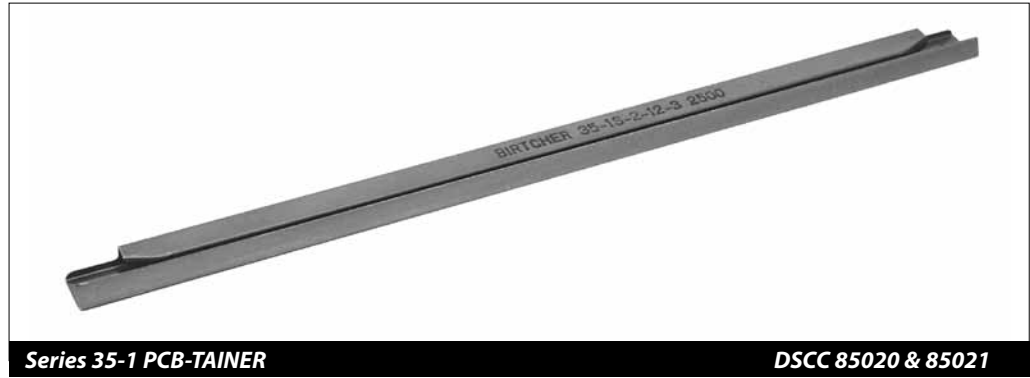
Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)





**FEATURES**

- Available with or without Flared Entry
- Choice of four board thicknesses
- Choice of three materials
- Choice of seven finishes or no finish for Beryllium Copper. Stainless steel parts are passivate only
- Spring design to retain board module assembly



**Series 35-1 PCB-TAINER**

**DSCC 85020 & 85021**

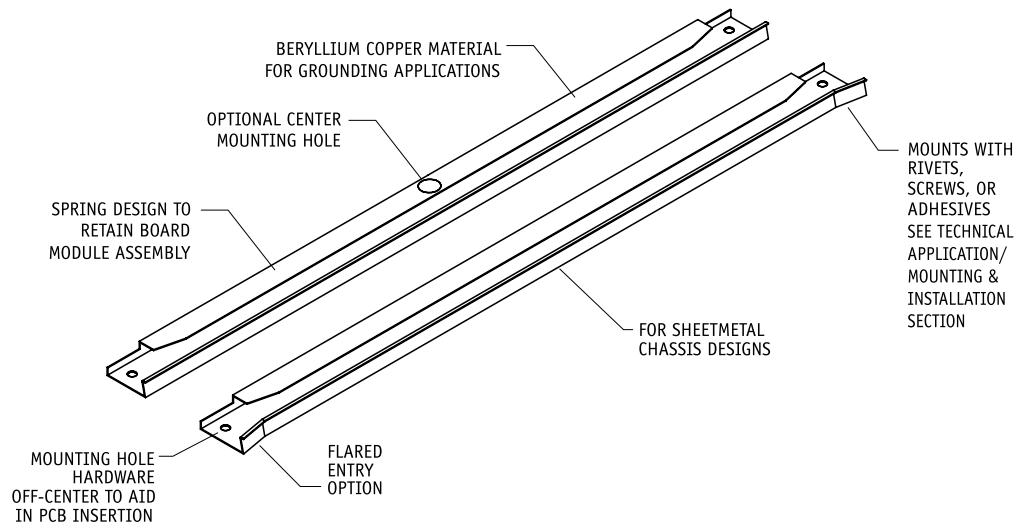
**APPLICATIONS**

- Where metal guides are required
- Moderate heat transfer and vibration
- Electrically and thermally conductive
- Install with rivets, screws or adhesives

Meets the requirements of drawings 85020 and 85021 for flared entry, Defense Supply Center, Columbus.

An optional 7.50-in. length is available as a special part: Part No. 35-1X-T-15-F

**MODERATE HEAT & VIBRATION APPLICATIONS  
ELECTRICALLY & THERMALLY CONDUCTIVE**

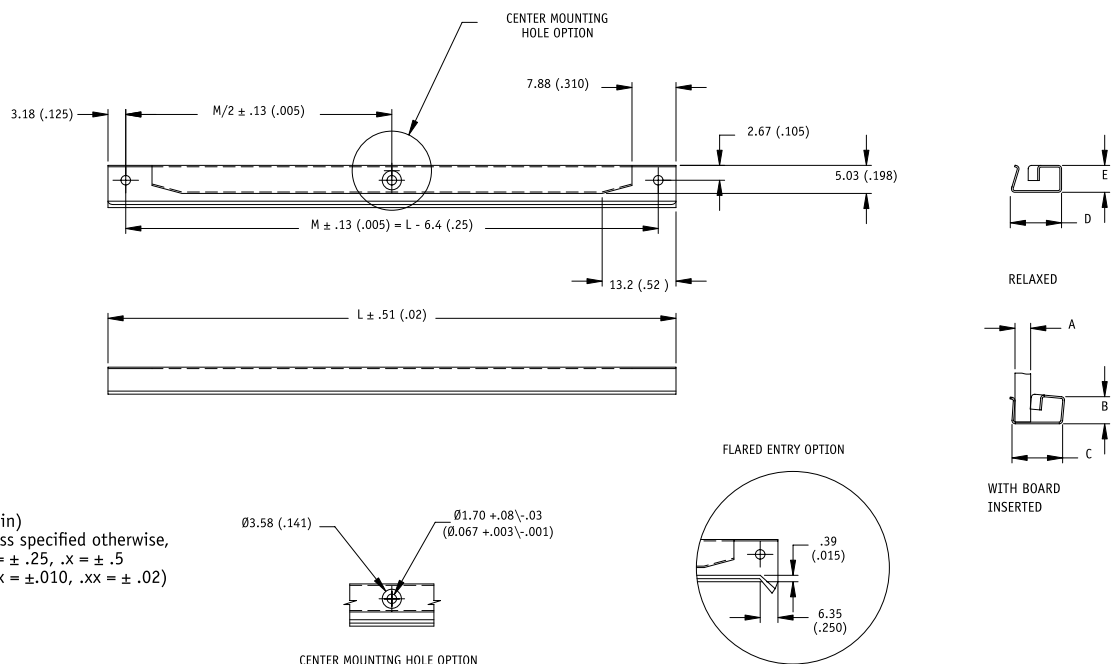


**MATERIAL**

.008-in. (.20-mm) thick Beryllium Copper or Stainless Steel

**WEIGHT**

.033 oz./in. (0.37 g/cm) Either material



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

**1 MATERIALS TABLE**

CODE LETTER	MATERIAL
<b>B</b>	BERYLLIUM COPPER, 1/4H PER, ASTM-B-194
<b>BH</b>	BERYLLIUM COPPER, 1/4 HT PER QQ-C-533, HEAT TREATED
<b>CR</b>	STAINLESS STEEL, TYPE 301 COND 1/4 H PER AMS 5517

**2 DIMENSION TABLE**

DASH #	A BOARD THICKNESS	B	C MAX		D	E
			35-1	35F-1		
-1	0.79 (.031)	4.58 (.180)	8.39 (.330)	9.15 (.360)	7.57 (.298)	3.97 (.156)
-2	1.59 (.063)	4.58 (.180)	8.39 (.330)	9.15 (.360)	7.57 (.298)	3.97 (.156)
-3	2.38 (.094)	4.58 (.180)	8.39 (.330)	9.15 (.360)	7.57 (.298)	3.97 (.156)
-4	3.18 (.125)	4.58 (.180)	9.40 (.370)	10.16 (.400)	8.39 (.330)	3.97 (.156)

**3 FINISH TABLE**

DASH #	CONTACT FACTORY FOR OTHER FINISHES FINISH (see pg.11 for RoHS Compliance)
[blank]	SILVER PLATE PER QQ-S-365, TYPE III, GRADE A
-1	NONE
-2	EBANOL PER MIL-F-495 FOR BERYLLIUM COPPER
-4	COPPER PLATE PER MIL-C-14550, CLASS 2
-5	GOLD PLATE PER MIL-G-45204, TYPE 1, CLASS 1
-6	NICKEL PLATE PER QQ-N-290, CLASS 1, GRADE G, BRIGHT
-7	ZINC PLATE CLEAR CHROMATE, PER ASTM-B-633, Fe/Zn 8
-8	ZINC PLATE YELLOW CHROMATE, PER ASTM-B-633 Fe/Zn 8

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

**Part Number Code**

Series 35-1 PCB-TAINER 35 | x | x | -1x | -x | -x | -x

**Center Mounting Hole:**  
Center Mounting Hole: \_\_\_\_\_ C  
None: \_\_\_\_\_ [Blank]

**Flared Entry**  
Flared Entry: \_\_\_\_\_ F  
None: \_\_\_\_\_ [Blank]

**Material**  
Select Code Letter from Material Table \_\_\_\_\_ 1

**Board Thickness**  
Select from Board Thickness Table \_\_\_\_\_ 2

**Length**  
Length in .500 (12.7) increments \_\_\_\_\_ 4 [2.00 (50.8)]  
\_\_\_\_\_ to 12 [6.00 (152.4)]  
Special Length \_\_\_\_\_ 15 [7.50 (190.5)]

**Finish (Beryllium Copper only)**  
Select from Finish Table \_\_\_\_\_ 3

No dash number required for CR material. Stainless steel parts are passivated only.

**Part Number Code example: 35C-1B-2-4-7**

Series 35-1 PCB-TAINER, with center mounting hole, Beryllium Copper, for .063-in. (1.59-mm) thick board, 2.00-in. (50.8-mm) long, zinc plate clear chromate finish

**FEATURES**

- Low profile, .125-in. (3.18-mm) high
- Choice of four board thicknesses
- Choice of three materials
- Choice of seven finishes or no finish for Beryllium Copper. Stainless steel parts are passivate only
- Spring design to clamp board module assembly

**APPLICATIONS**

- Where metal guides are required
- Moderate heat transfer and vibration
- Electrically and thermally conductive
- Install with rivets, screws or adhesives

**MATERIAL**

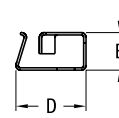
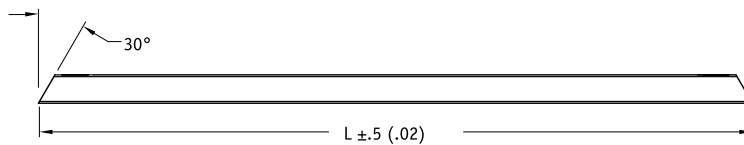
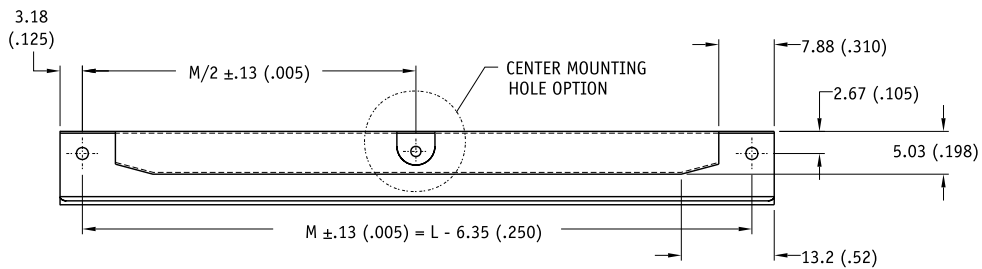
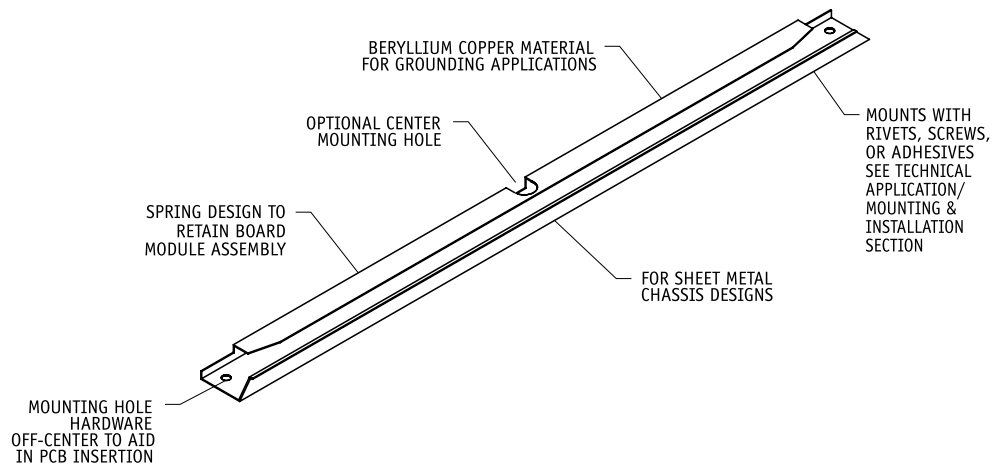
.008-in. (.20-mm) thick Beryllium Copper per ASTM B-194 or Stainless Steel per ASTM A-366

**WEIGHT**

.033 oz./in. (0.37 g/cm) Either material

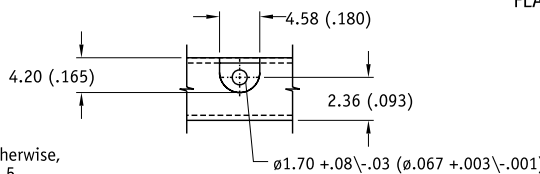


**MODERATE HEAT & VIBRATION APPLICATIONS  
ELECTRICALLY & THERMALLY CONDUCTIVE**

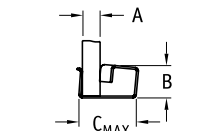
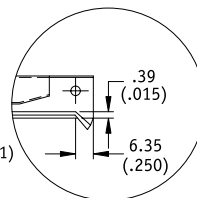


RELAXED

FLARED ENTRY OPTION DETAIL



CENTER MOUNTING HOLE OPTION



WITH BOARD INSERTED

Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)

**1 MATERIALS TABLE**

CODE LETTER	MATERIAL
<b>B</b>	BERYLLIUM COPPER, 1/4H PER, ASTM-B-194
<b>BH</b>	BERYLLIUM COPPER, 1/4 HT PER QQ-C-533, HEAT TREATED
<b>CR</b>	STAINLESS STEEL, TYPE 301 COND 1/4 H PER AMS 5517

**2 DIMENSION TABLE**

DASH #	A BOARD THICKNESS	B	C <sub>MAX</sub>	D	E
-1	0.79 (.031)	3.31 (.130)	8.13 (.320)	7.57 (.298)	3.18 (.125)
-2	1.60 (.063)	3.31 (.130)	8.13 (.320)	7.57 (.298)	3.18 (.125)
-3	2.39 (.094)	3.31 (.130)	9.15 (.360)	7.57 (.298)	3.18 (.125)
-4	3.18 (.125)	3.31 (.130)	9.40 (.370)	8.87 (.349)	3.18 (.125)

**3 FINISH TABLE**

CONTACT FACTORY FOR OTHER FINISHES

DASH #	FINISH (see pg.11 for RoHS Compliance)
[blank]	SILVER PLATE PER QQ-S-365, TYPE III, GRADE A
-1	NONE
-2	EBANOL PER MIL-F-495 FOR BERYLLIUM COPPER
-4	COPPER PLATE PER MIL-C-14550, CLASS 2
-5	GOLD PLATE PER MIL-G-45204, TYPE 1, CLASS 1
-6	NICKEL PLATE PER QQ-N-290, CLASS 1, GRADE G, BRIGHT
-7	ZINC PLATE CLEAR CHROMATE, PER ASTM-B-633, Fe/Zn 8
-8	ZINC PLATE YELLOW CHROMATE, PER ASTM-B-633 Fe/Zn 8

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

**Part Number Code**

Series 35-2 Low Profile PCB-TAINER      35    x    x    -2x    -x    -x    -x

**Center Mounting Hole:**  
 Center Mounting Hole: \_\_\_\_\_ C  
 None: \_\_\_\_\_ [Blank]

**Flared Entry**  
 Flared Entry: \_\_\_\_\_ F  
 None: \_\_\_\_\_ [Blank]

**Material**  
 Select Code Letter from Material Table \_\_\_\_\_ 1

**Board Thickness**  
 Select from Board Thickness Table \_\_\_\_\_ 2

**Length**  
 Length in .500 (12.7) increments \_\_\_\_\_ 4 [2.00 (50.8)]  
 \_\_\_\_\_ to 12 [6.00 (152.4)]

**Finish**  
 Select from Finish Table \_\_\_\_\_ 3

No dash number required for CR material. Stainless steel parts are passivated only.

**Part Number Code example: 35C-2B-2-8-7**

Series 35 Low Profile PCB-TAINER, Beryllium Copper, with Center Mounting Hole, .063-in. (1.60-mm) thick board, 4.00-in. (101.6-mm) long, Zinc Plate Clear Chromate finish.

**FEATURES**

- Designed with or without Flared Entry
- Choice of four board thicknesses
- Choice of three materials
- Choice of seven finishes or no finish for Beryllium Copper. Stainless steel parts are passivate only
- Spring design to clamp board module assembly
- 35-5 offers special 1.37-in. (34.8-mm) short length

**APPLICATIONS**

- Where metal guides are required
- Moderate heat transfer and vibration
- Electrically and thermally conductive
- Install with rivets, screws or adhesives

**MATERIAL**

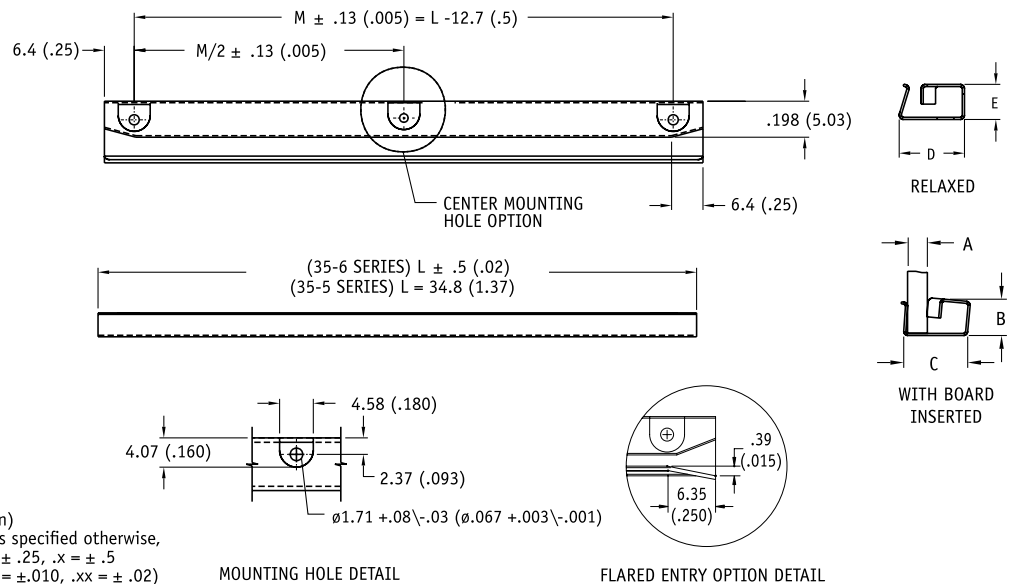
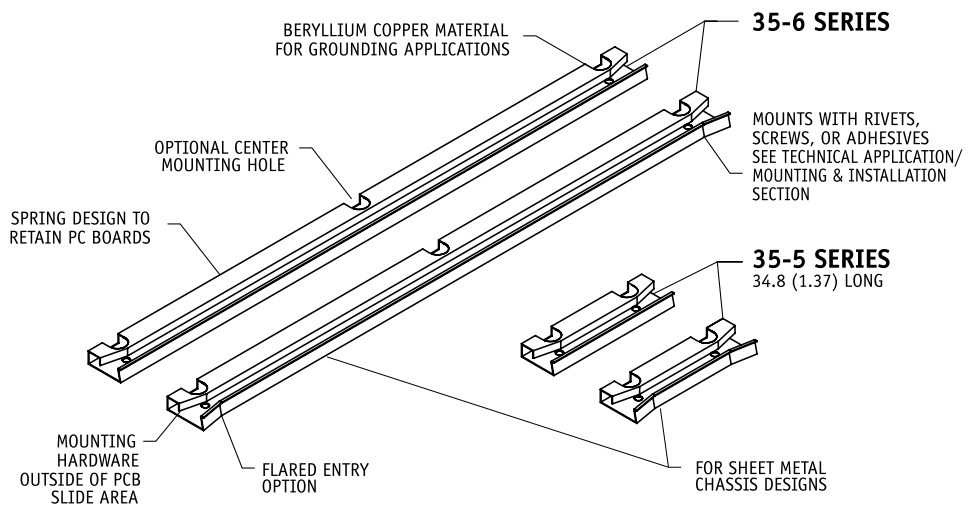
.008-in. (.20-mm) thick Beryllium Copper per ASTM B-194 or Stainless Steel per ASTM A-366

**WEIGHT**

.033 oz./in. (0.37 g/cm) Either material



**HEAT & VIBRATION APPLICATIONS  
ELECTRICALLY & THERMALLY CONDUCTIVE**



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



**FEATURES**

- Available with or without Flared Entry
- Choice of three board thicknesses
- Choice of three materials
- Choice of seven finishes or no finish for Beryllium Copper. Stainless steel parts are passivate only
- Spring design to clamp board module assembly

Meets the requirements of drawings 85020 and 85021 for flared entry, Defense Supply Center, Columbus

**APPLICATIONS**

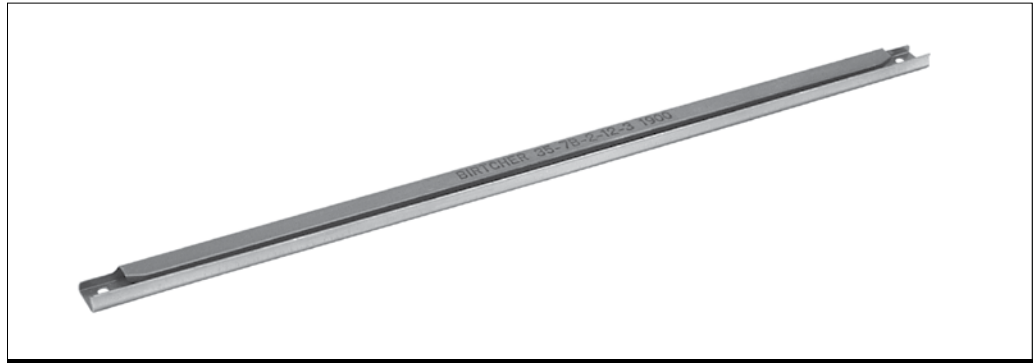
- Where metal guides are required
- Moderate heat transfer and vibration
- Electrically and thermally conductive
- Install with rivets, screws or adhesives

**MATERIAL**

.005-in. (.13-mm) thick Beryllium Copper per QQ-C-533 or Stainless Steel per Mil-S-5059

**WEIGHT**

.015 oz./in. (0.17 g/cm) Either Material

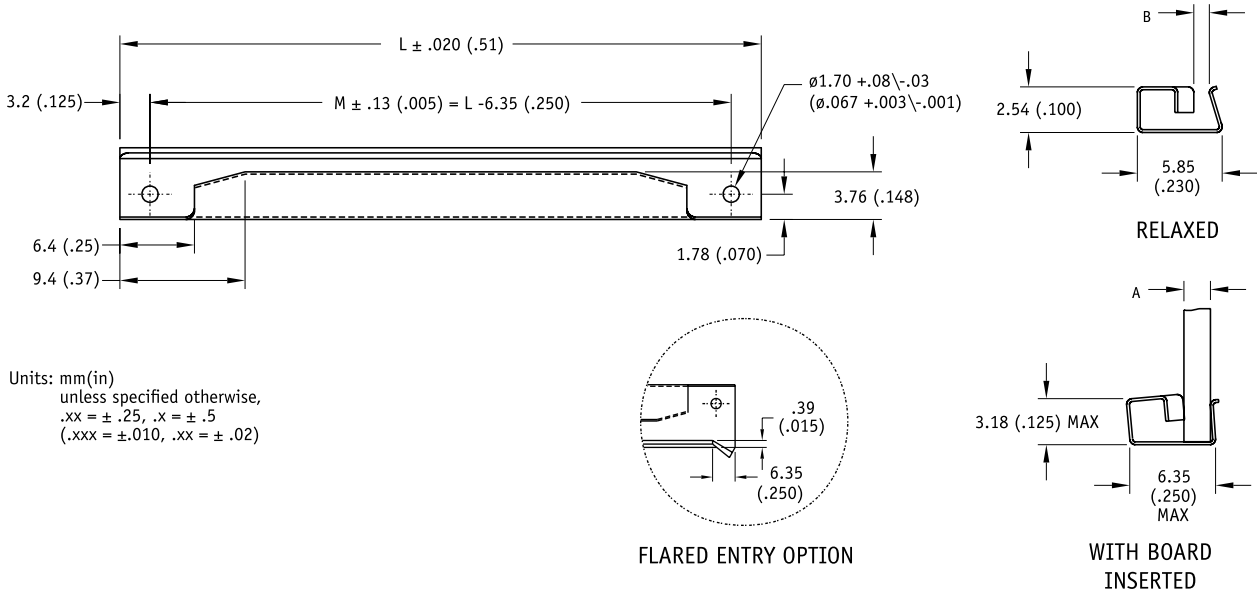
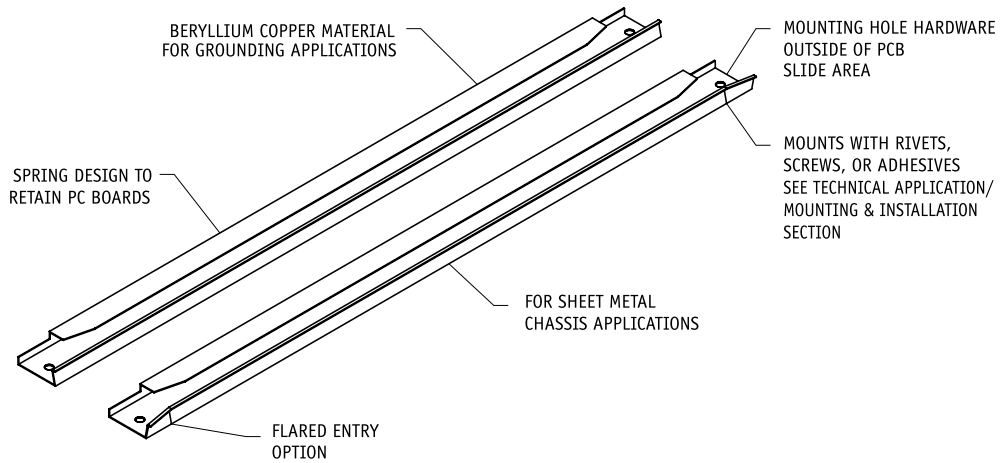


Series 35-7 PCB-TAINER

DSCC 85020 & 85021

**SHOCK & VIBRATION APPLICATIONS  
LOW HEAT DISSIPATION**

3.18 (.125) IN HEIGHT





**FEATURES**

- Available with or without Flared Entry
- Choice of three materials
- Choice of seven finishes or no finish for Beryllium Copper. Stainless steel parts are passivate only
- Spring design to clamp board module assembly

**APPLICATIONS**

- Low Profile VME
- Where metal guides are required
- Moderate heat transfer and vibration
- Electrically and thermally conductive
- Install with rivets, screws or adhesives

**MATERIAL**

.13 (.005) Beryllium Copper per ASTM B-194 or Stainless Steel per Mil-S-5059

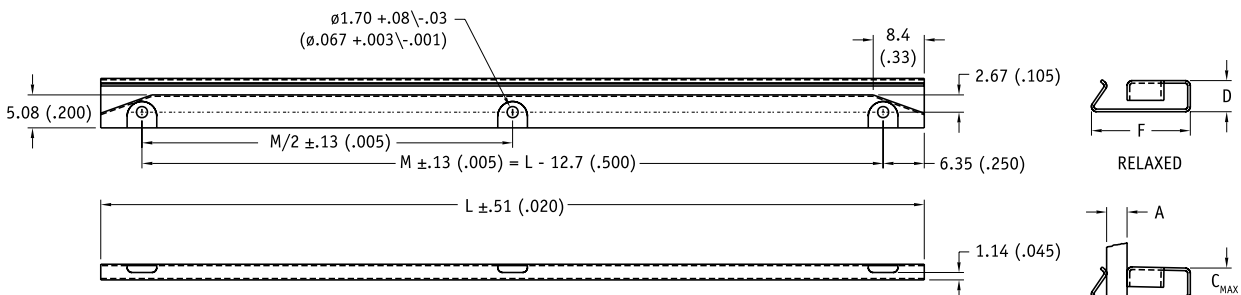
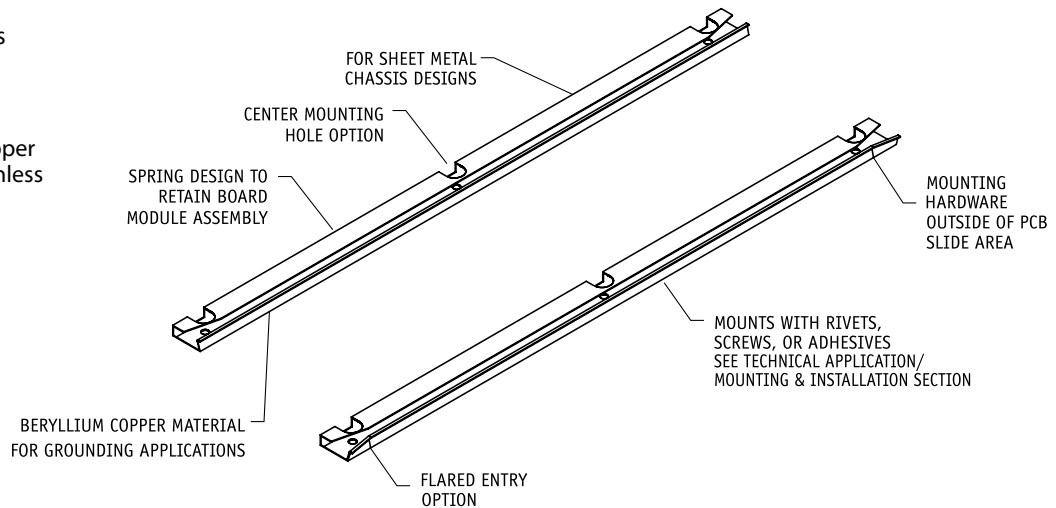
**WEIGHT**

.033 oz./in. (0.37 g/cm)  
Either material

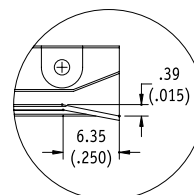
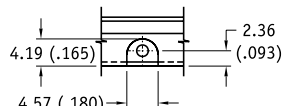


**Series 35-8 PCB-TAINER**

**SHOCK & VIBRATION APPLICATIONS  
ELECTRICALLY & THERMALLY CONDUCTIVE  
2.49 (.098) IN HEIGHT**



Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



**1 MATERIALS TABLE**

CODE LETTER	MATERIAL
B	BERYLLIUM COPPER, 1/4H PER, ASTM-B-194
BH	BERYLLIUM COPPER, 1/4 HT PER QQ-C-533, HEAT TREATED
CR	STAINLESS STEEL, TYPE 301 COND 1/4 H PER AMS 5517

**2 DIMENSION TABLE**

DASH #	BOARD THICKNESS				
	A	C <sub>MAX</sub>	D	E <sub>MAX</sub>	F
- 1	.79 (.031)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
- 2	1.60 (.063)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
- 3	2.36 (.093)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-24	.61/.74 (.024/.029)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-30	.76/.89 (.030/.035)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-36	.91/1.02 (.036/.040)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-55	1.40/1.52 (.055/.060)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-61	1.55/1.68 (.061/.066)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-67	1.70/1.80 (.067/.071)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-73	1.85/1.98 (.073/.078)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-79	2.01/2.13 (.079/.084)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-83	2.11/2.24 (.083/.088)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-85	2.16/2.21 (.085/.087)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-88	2.24/2.36 (.088/.093)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)
-94	2.39/2.46 (.094/.097)	2.49 (.098)	2.41 (.095)	7.75 (.305)	7.62 (.300)

**3 FINISH TABLE**

CONTACT FACTORY FOR OTHER FINISHES

DASH #	FINISH (see pg.11 for RoHS Compliance)
[blank]	SILVER PLATE PER QQ-S-365, TYPE III, GRADE A
-1	NONE
-2	EBANOL PER MIL-F-495 FOR BERYLLIUM COPPER
-4	COPPER PLATE PER MIL-C-14550, CLASS 2
-5	GOLD PLATE PER MIL-G-45204, TYPE 1, CLASS 1
-6	NICKEL PLATE PER QQ-N-290, CLASS 1, GRADE G, BRIGHT
-7	ZINC PLATE CLEAR CHROMATE, PER ASTM-B-633, Fe/Zn 8
-8	ZINC PLATE YELLOW CHROMATE, PER ASTM-B-633 Fe/Zn 8

**FOR MECHANICAL AND THERMAL PERFORMANCE SEE THE TECHNICAL REFERENCE SECTION Pages 74-92**

**Part Number Code**

Series 35-8 Low Profile VME PCB-TAINER    35    x    x-8x    -x    -x    -x

**Center Mounting Hole:**  
 Center Mounting Hole: \_\_\_\_\_ C  
 None: \_\_\_\_\_ [Blank]

**Flared Entry**  
 Flared Entry: \_\_\_\_\_ F  
 None: \_\_\_\_\_ [Blank]

**Material**  
 Select Code Letter from Material Table \_\_\_\_\_ 1

**Board Thickness**  
 Select from Board Thickness Table \_\_\_\_\_ 2

**Length**  
 Length in .500 (12.7) increments \_\_\_\_\_ 2 [1.00 (25.4)]  
 \_\_\_\_\_ to 12 [6.00 (152.4)]

**Finish**  
 Select from Finish Table \_\_\_\_\_ 3

No dash number required for CR material. Stainless steel parts are passivated only.

**Part Number Code example: 35-8B-61-10-6**  
 35 Series PCB-TAINER, Beryllium Copper, for .061/.066-in. (1.55/1.68-mm) board thickness range, 5.00-in. (127.0-mm) long, Nickel Plate finish.

**FEATURES**

- Available with Flared Entry
- Choice of three materials
- Choice of seven finishes or no finish for Beryllium Copper. Stainless steel parts are passivate only
- Spring design to clamp board module assembly

**APPLICATIONS**

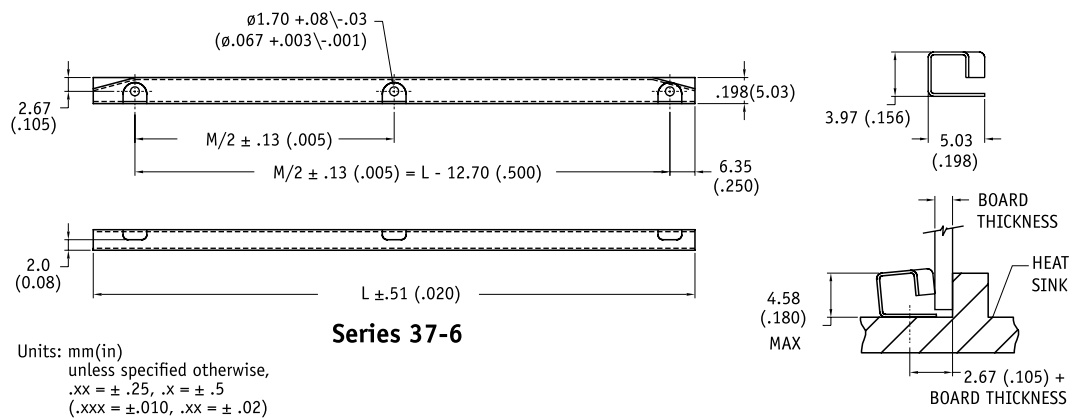
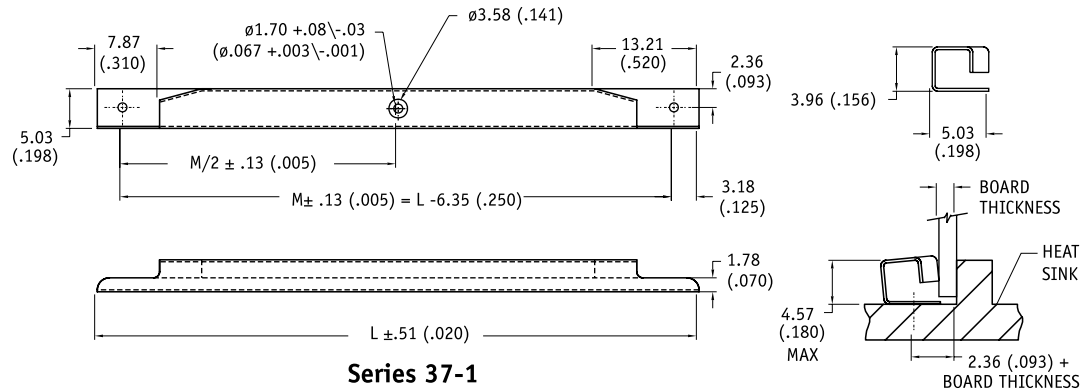
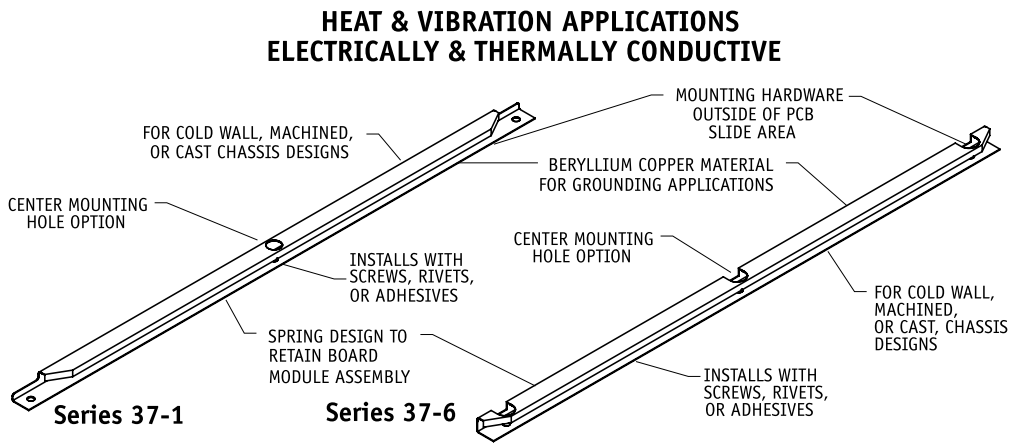
- Where metal guides are required
- Moderate heat transfer and vibration
- Electrically and thermally conductive
- Install with rivets, screws or adhesives
- For use with heat sinks

**MATERIAL**

.005-in. (.13-mm) Beryllium Copper per ASTM B-194 or Stainless Steel per Mil-S-5059

**WEIGHT**

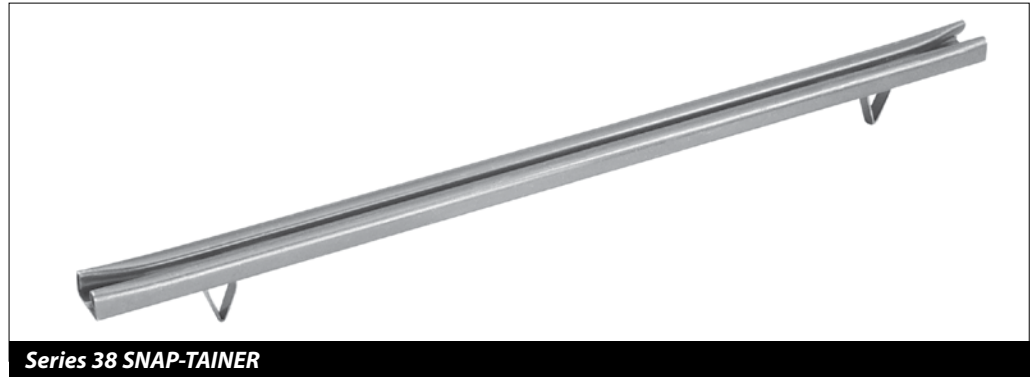
.033 oz./in. (0.37 g/cm) Either material





## FEATURES

- Snap-in design provides low cost installations
- Requires no custom installation tools
- Provides flared ends for easy insertion of the PC board
- Available for standard board thicknesses
- Available in standard lengths from 3.00 in. (76.2 mm) to 8.00 in. (203.2 mm) in .500-in. (12.7-mm) increments. Use two SNAP-TAINER™ retentive guides installed end-to-end to create the length desired
- Snaps firmly in sheet metal with thickness range of .048-in. (1.19-mm) through .063-in. (1.60-mm) thickness. C'Sink .195/.205-in. (4.95/5.21-mm) Dia. both sides



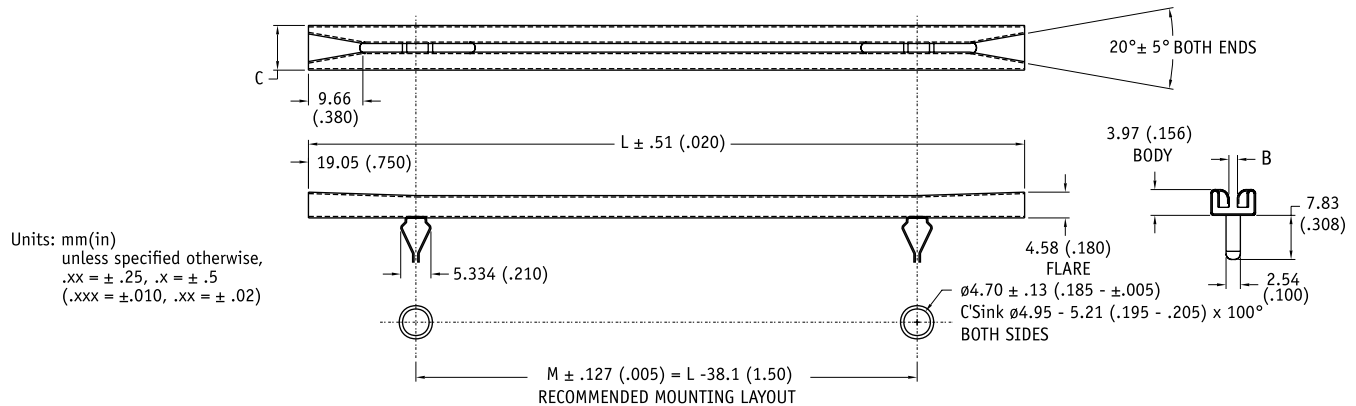
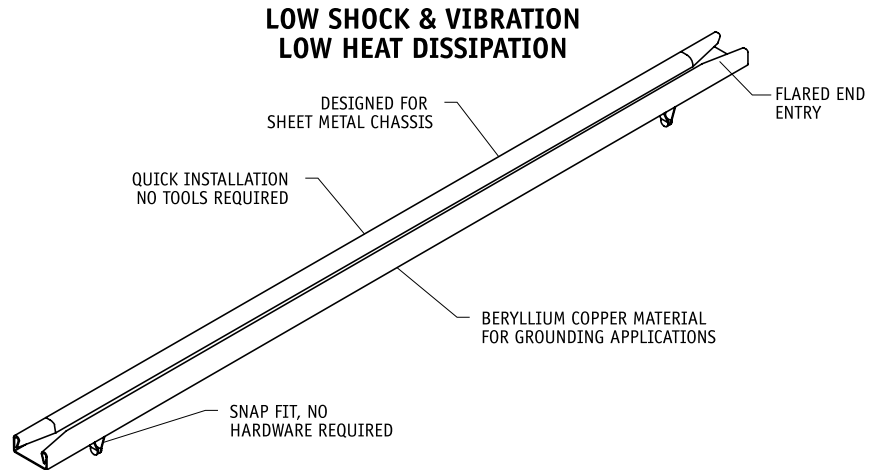
Series 38 SNAP-TAINER

## MATERIAL

.010-in. (.25-mm) thick Beryllium Copper 1/4 HT per QQ-C-533, Heat Treated

## WEIGHT

.048 oz./in. (.54 g/cm)



### Part Number Code

Series 38 SNAP-TAINER Card Guide

38 -x -x -x

#### Board Thickness

Select from Board Thickness Table \_\_\_\_\_ 1

#### Length

Length in .500 (12.7) increments \_\_\_\_\_ 6 [3.00 (76.2)]  
to 16 [8.00 (203.2)]

#### Finish

Select from Finish Table \_\_\_\_\_ 2

### Part Number Code example: 38-3-14-8

Series 38 SNAP-TAINER Card Guide, for .094-in. (2.38-mm) thick board, 7.00-in. (177.8-mm) long, zinc plate yellow chromate finish.

### 1 BOARD THICKNESS TABLE

DASH #	THICKNESS ±.130 (.005)	B		C
		+ .130/-2.54 (+.005/- .010)		±.254 (.010)
-1	0.79 (.031)	0.76 (.030)		7.92 (.312)
-2	1.59 (.063)	1.52 (.060)		7.92 (.312)
-3	2.38 (.094)	2.29 (.090)		8.89 (.350)
-4	3.18 (.125)	3.18 (.125)		9.65 (.380)

### 2 FINISH TABLE

CONTACT FACTORY FOR OTHER FINISHES

DASH #	FINISH (see pg.11 for RoHS Compliance)
[blank]	SILVER PLATE PER QQ-S-365, TYPE III, GRADE A
-1	NONE
-4	COPPER PLATE PER MIL-C-14550, CLASS 2
-5	GOLD PLATE PER MIL-G-45204, TYPE 1, CLASS 1
-6	NICKEL PLATE PER QQ-N-290, CLASS 1, GRADE G, BRIGHT
-7	ZINC PLATE CLEAR CHROMATE, PER ASTM-B-633, Fe/Zn 8
-8	ZINC PLATE YELLOW CHROMATE, PER ASTM-B-633 Fe/Zn 8

## FEATURES

- Permits horizontal and vertical mounting of extra large boards
- .200-in. (5.08-mm) slot depth allows added tolerances to board dimensions
- Extra holding action with its .080-in. (2.03-mm) x .200-in. (5.08-mm) channel
- Available 2.50-in. (63.5-mm) to 8.00-in. (203.2-mm) lengths
- Snap-in installation with any metal plate .047-in. (1.19-mm) to .090-in. (2.29-mm) thick
- Guides can be mounted end to end for tandem assembly and extra length
- Mounting hole size  $\varnothing 4.75 \pm .003$  in. ( $\varnothing 119.1 \pm .076$  mm) in any plate .047 to .090-in. (1.19 to 2.29-mm) thick. Rear hole should be oblong .187 x .230/.280 in. (4.75 x 5.84/7.11 mm)

## APPLICATIONS

- For 1/16-in. (1.6-mm) and 1/8-in. (3.18-mm) PCBs
- The Series 94 Deep Channel Card Guides allow more PCB lateral play and greater board tolerance
- VME Subracks and Eurocard Subracks

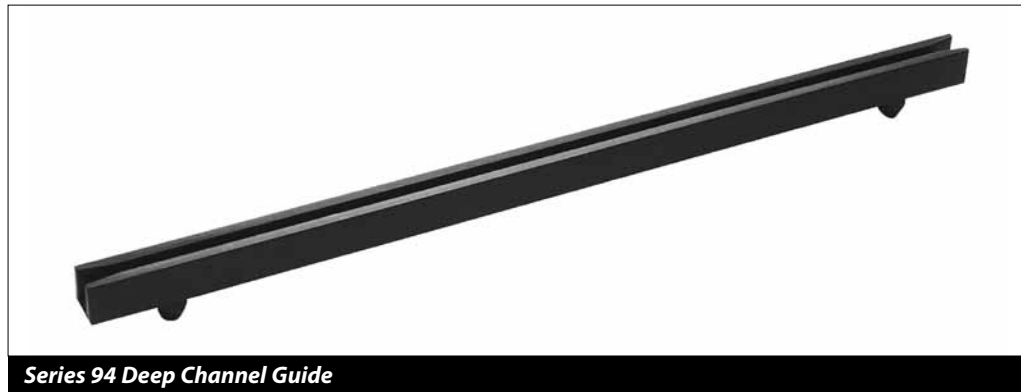
## MATERIAL

Type 6/6 Nylon, Black

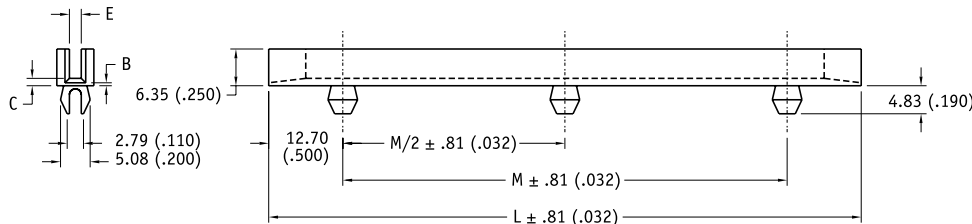
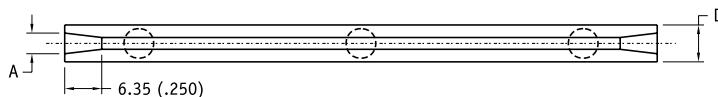
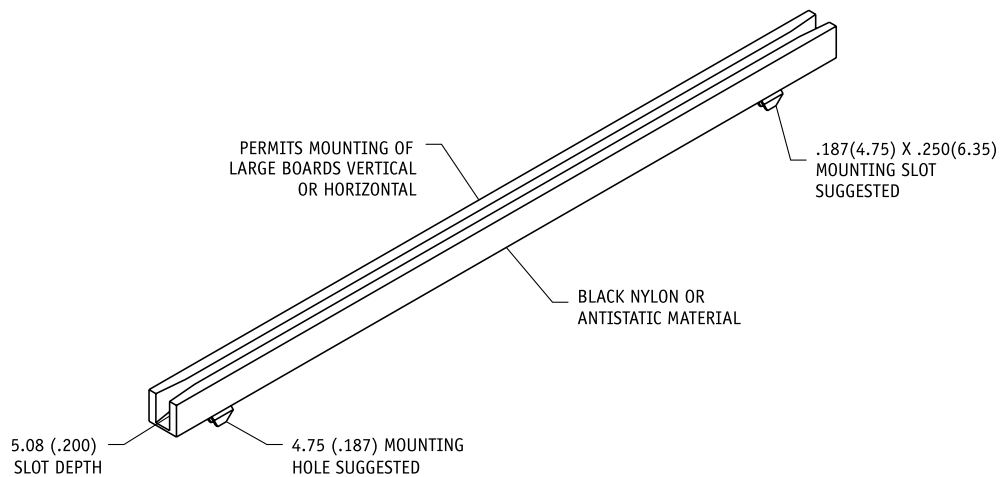
## WEIGHT

.03 oz./in. (0.34 g/cm)

Units: mm(in)  
 unless specified otherwise,  
 .xx = ± .25, -x = ± .5  
 (.xxx = ± .010, .xx = ± .02)



Series 94 Deep Channel Guide



**Part Number Code**  
 Series 94 Deep Channel Guide      94    -x    -x

**Board Thickness**  
 Select Dash Number from Board Thickness Table    1

**Length**  
 Select Dash Number from Mounting Dimensions Table    2

### 1 BOARD THICKNESS TABLE

DASH #	BOARD THICKNESS	E SLOT WIDTH
-2	1.59 (.063)	2.03 (.080)
-4	3.18 (.125)	3.35 (.132)

### 2 MOUNTING DIMENSIONS TABLE

PART #	LENGTH	M	A	B ± .18 (.007)	C ± .08 (.003)	D
94-2-5	63.50 (2.50)	38.10 (1.50)	3.35 (.132)	.457 (.018)	1.27 (.050)	6.35 (.250)
94-2-9	114.30 (4.50)	88.90 (3.50)	3.35 (.132)	.457 (.018)	1.27 (.050)	6.35 (.250)
94-2-12	152.40 (6.00)	127.00 (5.00)	3.35 (.132)	.457 (.018)	1.27 (.050)	6.35 (.250)
94-2-16	203.20 (8.00)	177.80 (7.00)	3.35 (.132)	.457 (.018)	1.27 (.050)	6.35 (.250)
94-4-9	114.30 (4.50)	88.90 (3.50)	4.06 (.160)	.508 (.020)	1.27 (.050)	6.35 (.250)
94-4-16	203.20 (8.00)	177.80 (7.00)	4.06 (.160)	.864 (.034)	1.63 (.064)	7.37 (.290)

### Part Number Code Example: 94-2-9

94 Series Deep Channel Guide, for .063-in. (1.59-mm) thick board, 4.50-in. (114.3-mm) long, in Nylon 6/6 material.



**FEATURES**

- Lightweight
- Strong
- Clear or black anodize
- Hard coat available
- Pin included

**APPLICATIONS**

- Provides ease of injection and extraction of PCBs

**MATERIAL**

**EXTRACTOR**

Aluminum Alloy 6063-T6 per QQ-A-200/9

**PIN**

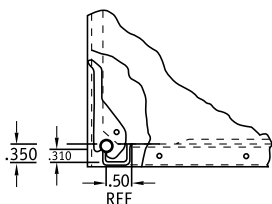
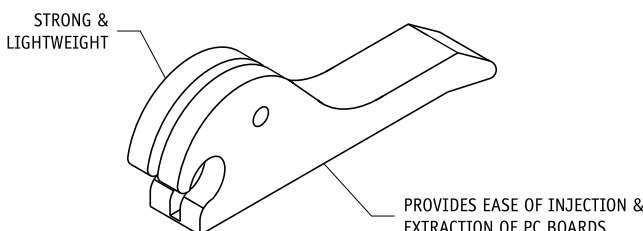
Stainless Steel, Passivated

**WEIGHT**

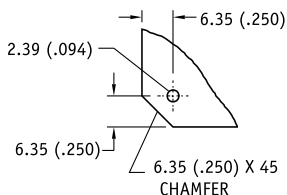
.27 oz. (7.7 g)



Series 73 Injector Extractor

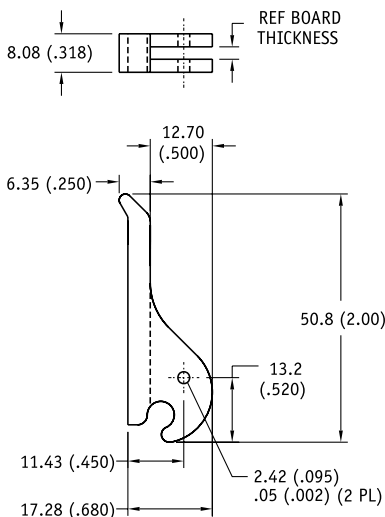


CARD CAGE FRONT CHANNEL  
DETAIL FOR SERIES 73 AND 87



**APPLICATION DATA**

Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



**Part Number Code** (See example below)

Series 73 Injector Extractor

73 -x -x

**Board Thickness**

Select a dash number from Board Thickness Table \_\_\_\_\_ 1

**Finish**

Select dash number from Finish Table \_\_\_\_\_ 2

**Part Number Code example: 73-2-3**

Series 73 extractor for .063-in. (1.59-mm) PCBs, hard black anodized.

**1 BOARD THICKNESS TABLE**

DASH #	BOARD THICKNESS
-1	0.79 (.031)
-2	1.59 (.063)
-3	2.38 (.094)
-4	3.18 (.125)

**2 FINISH TABLE**

DASH #	FINISH
-1	[blank]
-2	CLEAR ANODIZE, MIL-A-8625, TYPE II, CL1
-3	HARD ANODIZE, MIL-A-8625, TYPE III, CL2
[blank]	BLACK ANODIZE, MIL-A-8625, TYPE II, CL1

**FEATURES**

- Locks in place after insertion
- Provides ease of injection and extraction of PCBs
- Front face marking optional
- Two pins furnished with each extractor
- Meets the requirements of drawing 83023, Defense Supply Center, Columbus (DSCC).

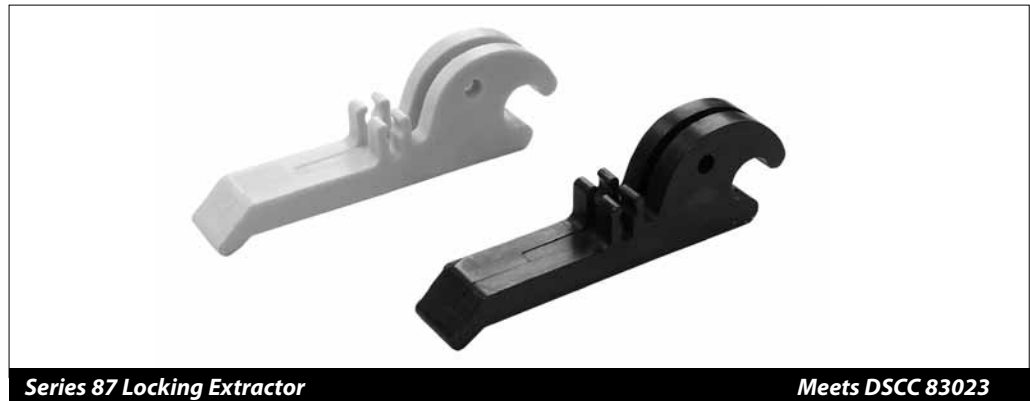
**MATERIAL**

**EXTRACTOR**

Type 6/6 Nylon per ASTM-D-4066, Type I

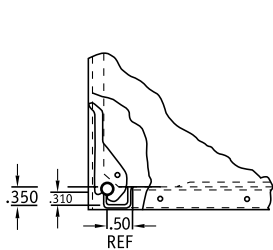
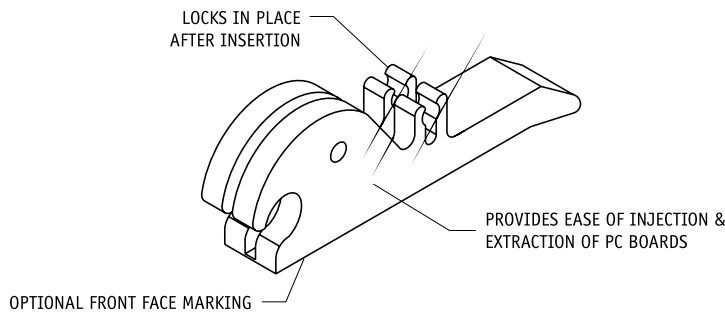
**PIN**

Stainless Steel, Passivated

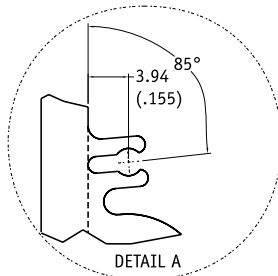


**Series 87 Locking Extractor**

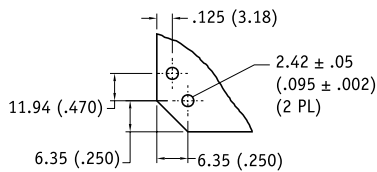
**Meets DSCC 83023**



CARD CAGE FRONT CHANNEL  
DETAIL FOR SERIES 73 AND 87

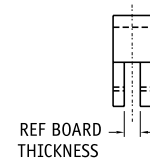
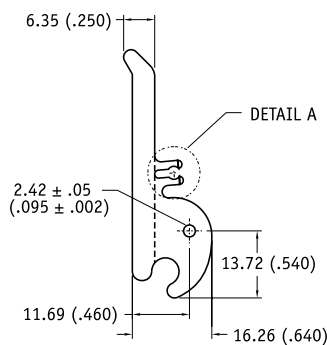


DETAIL A  
NOT TO SCALE



APPLICATION DATA  
SUGGESTED .25 X 45 CHAMFER

Units: mm(in)  
unless specified otherwise,  
.xx = ± .25, .x = ± .5  
(.xxx = ±.010, .xx = ± .02)



REF BOARD  
THICKNESS

**Part Number Code** (See example below)

Series 87 Nylon Locking Extractor

87 -x -x

**Board Thickness**

Select a dash number from Board Thickness Table \_\_\_\_\_ 1 |

**Color Finish**

Select dash number from Finish Table \_\_\_\_\_ 2 |

**1 BOARD THICKNESS TABLE**

DASH #	BOARD THICKNESS
-2	1.59 (.063)
-3	2.38 (.094)
-4	3.18 (.125)

**2 FINISH TABLE**

COLORS ARE AN ADDITIONAL CHARGE

DASH #	COLOR
-1	RED
-2	BLUE
-3	GREEN
-4	YELLOW
-5	BLACK
-6	ORANGE
-7	VIOLET
-8	GRAY
-9	BROWN
[blank]	NATURAL

**Part Number Code example: 87-3-5**

Series 87 Extractor for .094-in. (2.38-mm) board, color Black.

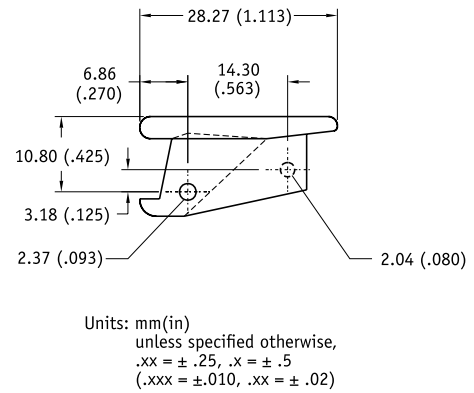
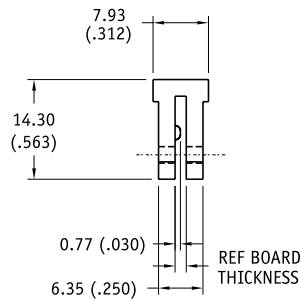
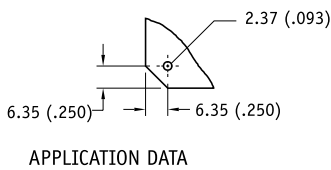
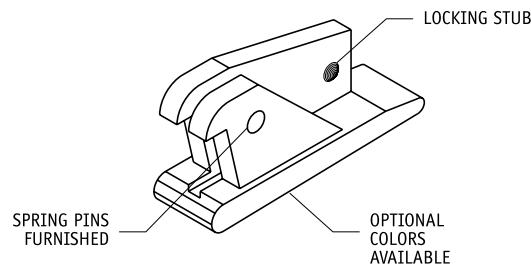
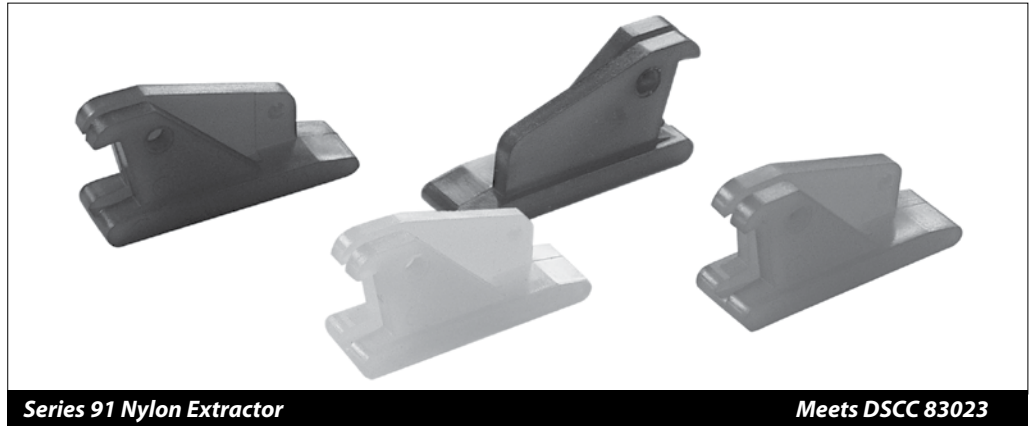
**FEATURES**

- Series 91 are locking extractors
- Fire retardant
- Furnished with spring pins
- Mounting slot dimensions: .063 PCBs use .073

**MATERIAL**

**EXTRACTOR**  
 Nylon material  
 Mil-M-206938  
 UL rated 94V-2

**PIN**  
 Stainless Steel, Passivated



**Part Number Code** (See example below)

**Series 91 Nylon Extractor** 91 -2 -x

**Finish**

Select dash number from Finish Table \_\_\_\_\_ 1

**Part Number Code example: 91-2-9**  
 Series 91 Extractor for .063-in. (1.59-mm) board, color Brown.

**1 FINISH TABLE**

COLORS ARE AN ADDITIONAL CHARGE

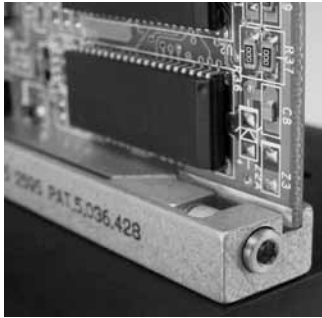
DASH #	COLOR
-1	RED
-2	BLUE
-3	GREEN
-4	YELLOW
-5	BLACK
-6	ORANGE
-7	VIOLET
-8	GRAY
-9	BROWN
[blank]	NATURAL



**WEDGE-LOK®**

**For cold-wall applications**

WEDGE-LOK retainers offer the highest locking force available for cold-wall applications. They mount to PC Board assemblies using screws, rivets or adhesive bonding and are then inserted into machined channels of cold plates or heat exchangers. The wedge design holds the PC Board firmly in place providing high resistance to shock and vibration while producing maximum thermal transfer.



**WEDGE-TAINER™**

**For sheet metal or non machined cold wall applications**

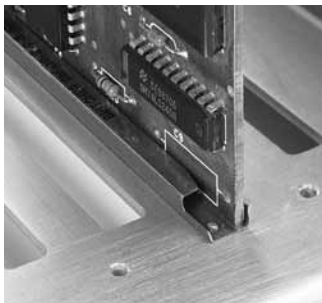
WEDGE-TAINER locking retainers are designed for heavy shock and vibration, and for effective heat dissipation in sheet metal chassis/heat sink applications. The design combines chassis mounted housing with WEDGE-LOK retainers.



**LOK-TAINER®**

**For sheet metal or cold wall applications**

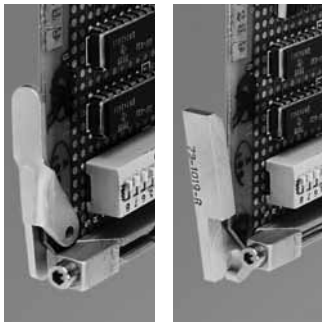
LOK-TAINER retainers are cam and lobe designs featuring lever or screw action for board retention. They are typically screw- or rivet-mounted to sheet metal chassis or to the PC board, achieving a zero insertion force configuration as well as high resistance to shock and vibration. LOK-TAINERS also provide outstanding grounding characteristics.



**PCB-TAINERS™**

**For sheet metal applications**

PCB-TAINER retainers feature a low-cost spring-action card retention design. They attach to the chassis using screws, rivets or adhesives and are designed primarily for use in sheet metal applications. PCB-TAINERS provide protection against shock and vibration and offer excellent grounding characteristics.



**INJECTORS & EXTRACTORS**

**Metal and plastic designs**

Birtcher offers a wide selection of Injectors and Extractors for use in both sheet metal and cold wall applications. Available in both metal and plastic designs, these products facilitate the insertion and extraction of printed circuit boards with high density backplane interconnects.

**Contents**

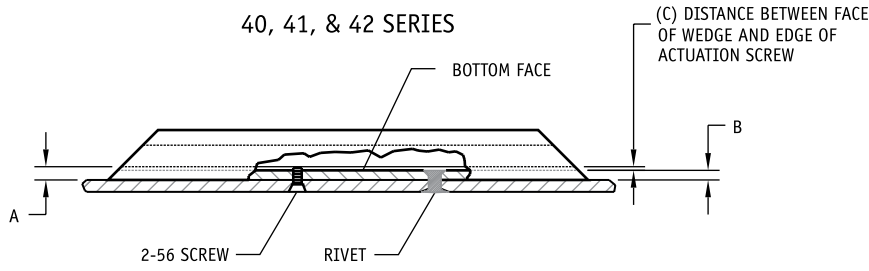
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Theoretical Discussion on WEDGE-LOK® & Ejector/Injectors.....	82
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**Technical Reference Tables:**

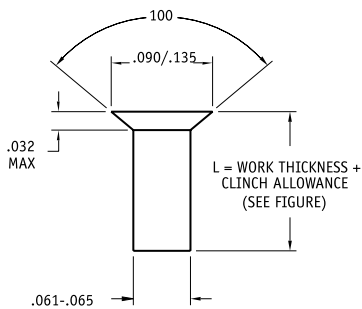
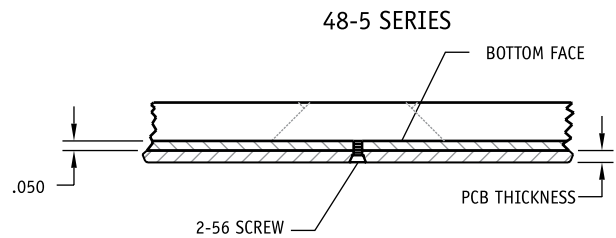
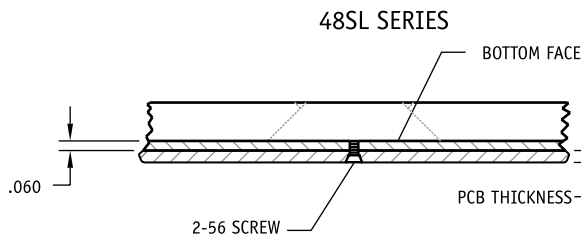
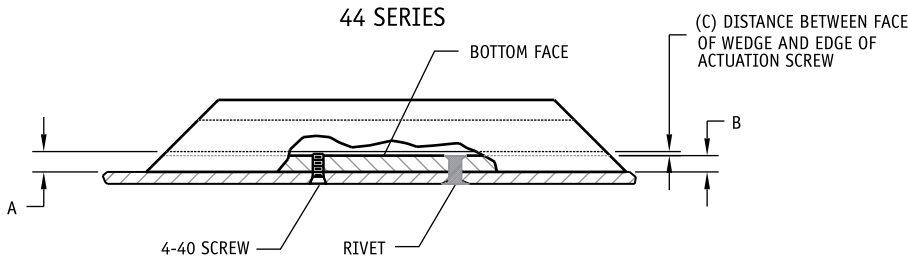
Table 1. ANSI Head Cap Screws.....	84
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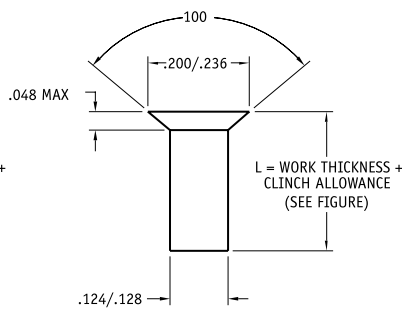
### CLEARANCE TABLE

SERIES #	A	B	C
40, 45	.069	.050	.019
41	.050	.045	.005
42	.049	.045	.004
44	.106	.085	.021

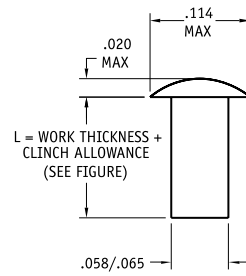
SCREW LENGTH AND HEAD STYLE DEPEND ON DETAILS OF THE APPLICATION. IN GENERAL, THE SCREW SHOULD NOT EXTEND BEYOND THE BOTTOM FACE OF THE WEDGE BODY.



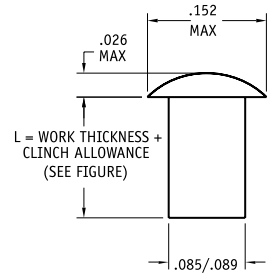
FOR RIVET MOUNTED SERIES 40, 41, & 42 WEDGE-LOKS



FOR RIVET MOUNTED SERIES 44 WEDGE-LOKS

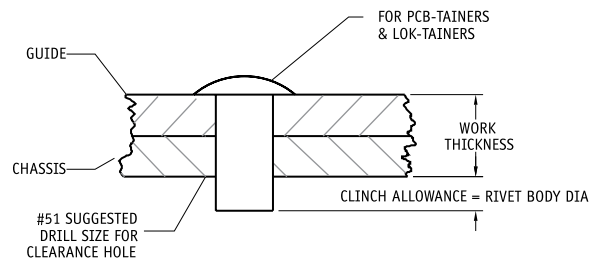
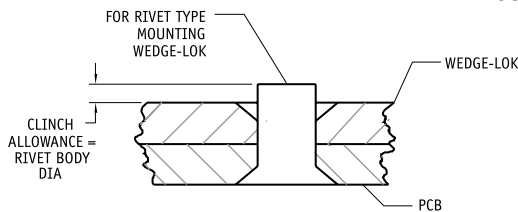


RIVET MOUNTING FOR ALL PCB-TAINERS & LOK-TAINERS



RIVET MOUNTING FOR 15-20 SERIES

### SUGGESTED RIVET DIMENSIONS



Birtcher offers a complete line of Printed Circuit Board (PCB) guides and retainers. In order to simplify the selection process, guides and retainers have been placed into three groups based upon performance and cost considerations. Should a standard catalog item not meet your needs, contact our application engineers to discuss a custom solution.

**Group 1 – PCB-TAINER™**

This group of card guides uses the inherent spring force to captivate circuit cards during shock and vibration. Most economical.

**Group 2 – LOK-TAINER®**

Zero insertion force with high clamping capability insures circuit cards will not be affected due to heavy shock and vibration conditions. Excellent heat transfer ability provides low junction temperature for most military applications.

**Group 3 – WEDGE-LOK®**

This group is built for the most demanding applications. (shipboard, airborne or space). Extremely high clamping force provides excellent vibration and shock resistance as well as exceptional heat transfer ability.

**Material and Finish Selection**

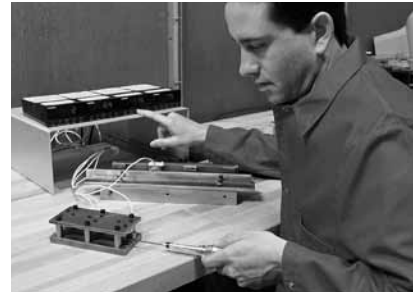
PCB-TAINERS are available in BeCu, heat treated BeCu, and stainless steel. See page 83 for various finishes for BeCu only.

LOK-TAINERS are available in steel and BeCu.

WEDGE-LOKS are constructed of Aluminum with finishes listed on page 83.

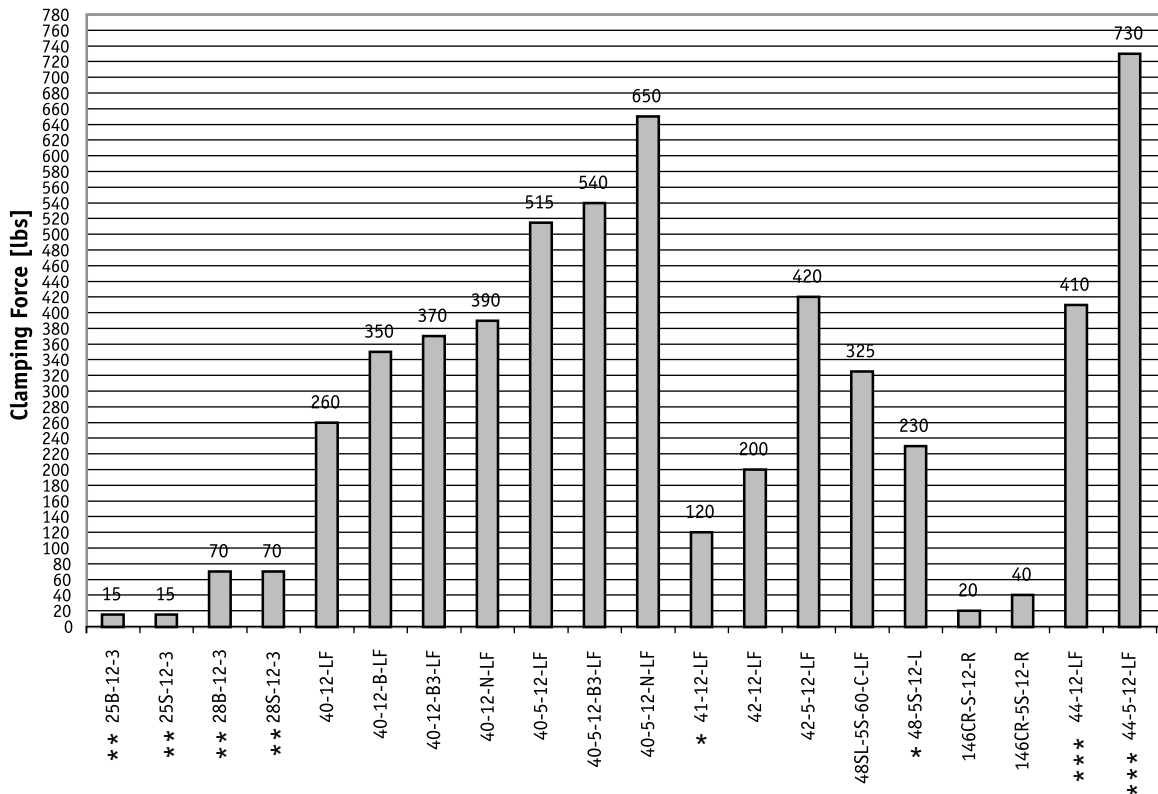
**Typical Expected Performance Levels - Clamping Force**

The total clamping force and the force distribution along the guide is an important consideration when selecting the proper guide. Figure 1. shows the clamping force (perpendicular to guides long axis) upon first actuation. All guides were torqued to the recommended value of 115 in.-oz. unless otherwise indicated. Values are for a single guide. All surfaces were cleaned with alcohol and no lubricants were used. Five-piece WEDGE-LOKS provide more force more evenly than three-piece WEDGE-LOKS. The performance of screw actuated guides will degrade with subsequent actuations due to normal thread wear. Lever actuated guides are sensitive to board thickness and/or slot width variation (see Figure. 3) whereas screw actuated guides provide a constant force over a wider operating range.



Performance data is for reference use only. Manufacturing variability, test conditions, and environmental conditions may affect results.

**Figure 1. Clamping Force**



\* Torqued to 64 in-oz due to reduced diameter screw.

\*\* Torqued to 25 in-oz due to LOK-TAINER design.

\*\*\* Torqued to 16 in-lbs due to larger diameter screw.

Figure 2. Clamping Force vs. Applied Torque 40-5-12-LF

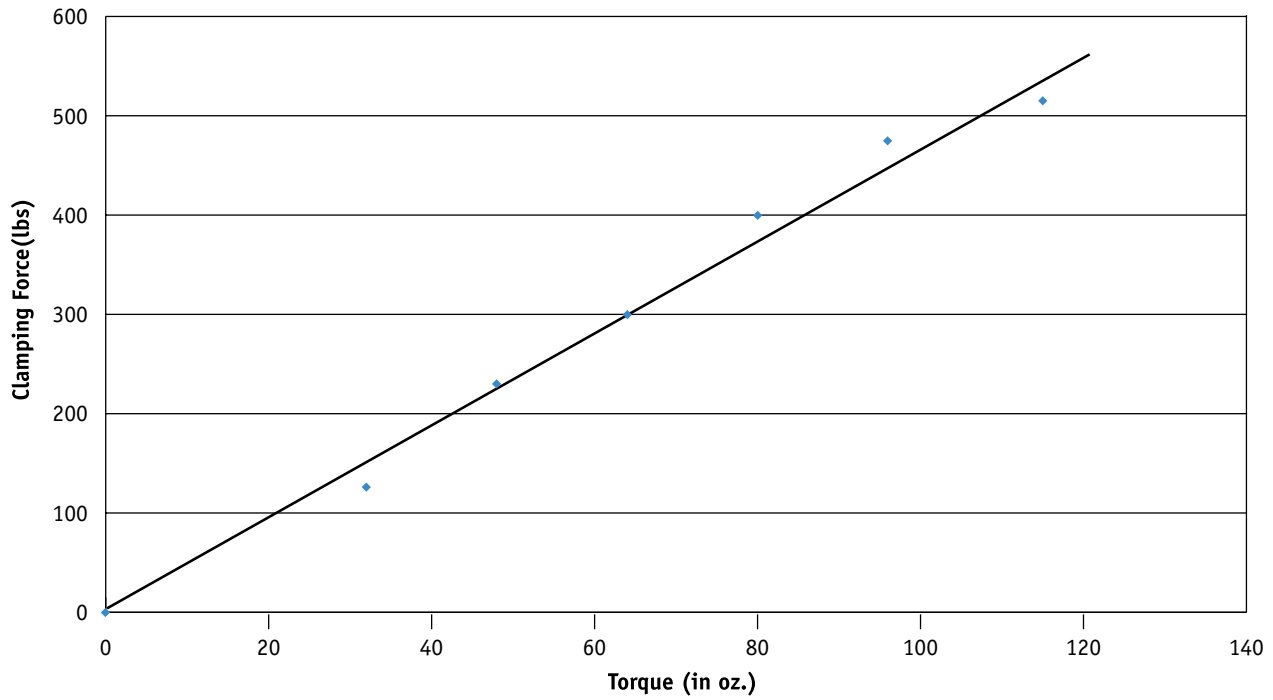


Figure 2. Shows the relationship between applied torque and clamping force output for the 40-5 series WEDGE-LOK™

Figure 3. Effect of Board Thickness Tolerance on Clamping Force for Lever-actuated Card Guides

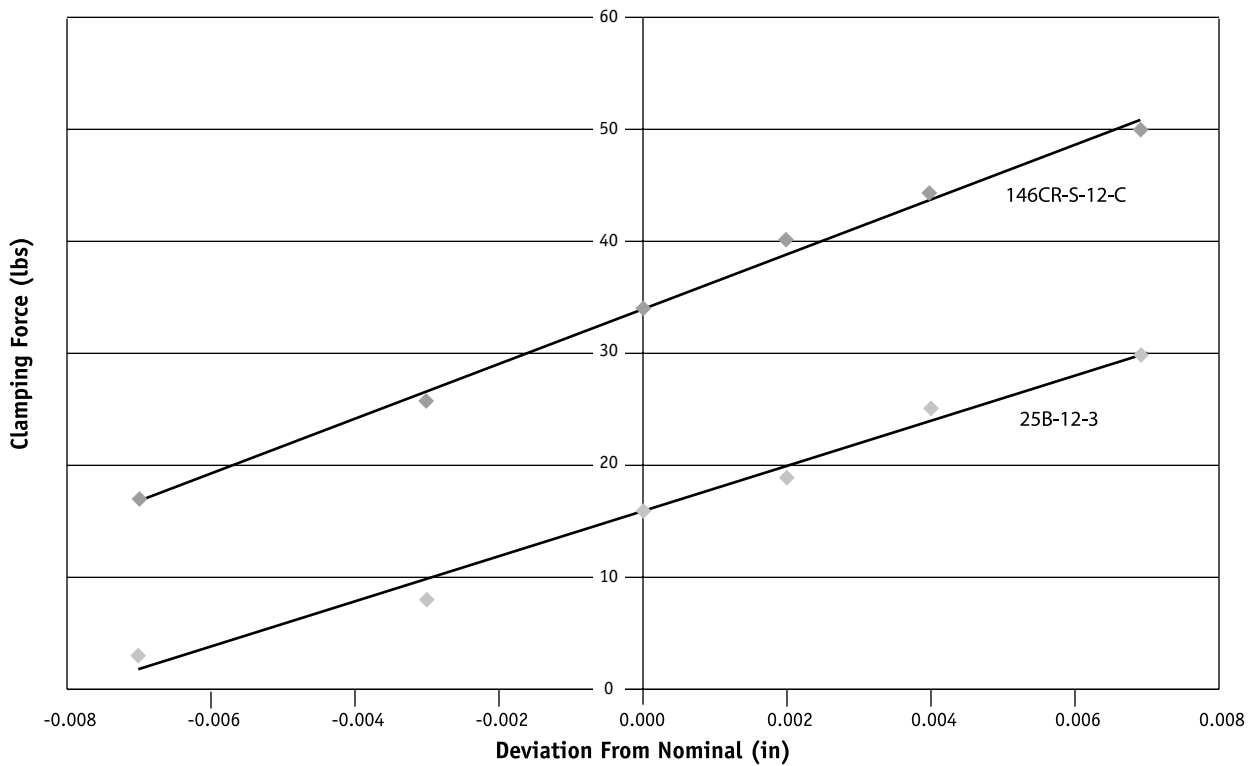


Figure 3. Illustrates how the clamping force varies with board thickness deviation from a nominal .063 board. A lever actuated LOK-TAINER® (25B-12-3) and WEDGE-LOK™ (146CR-S-12-C) were measured.

## Typical Expected Performance - Retention Force

Retention force is a measure of the force required to pull a locked circuit board out of a chassis. Figure 4, 5 and 6 show the retention forces for each group of card retainers. The values are for a pair of guides mounted on an epoxy glass board in an aluminum chassis. (Aluminum surface roughness = 300 micro inches). Many factors affect the retention force such as number of actuations, surface finish, lubrication, wear, manufacturing tolerance, etc. PCB-TAINERS® and lever actuated guides are sensitive to board thickness tolerance.



Figure 4. Retention Force Wedge-Lok™

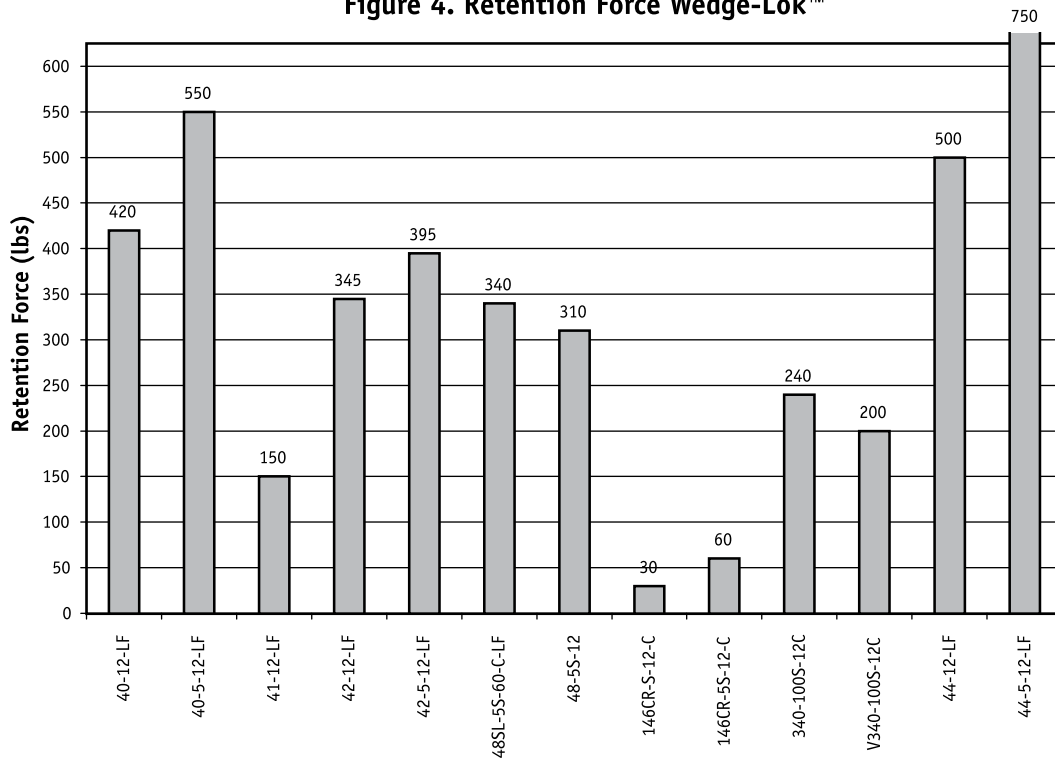


Figure 5. Retention Force Lok-Tainer®

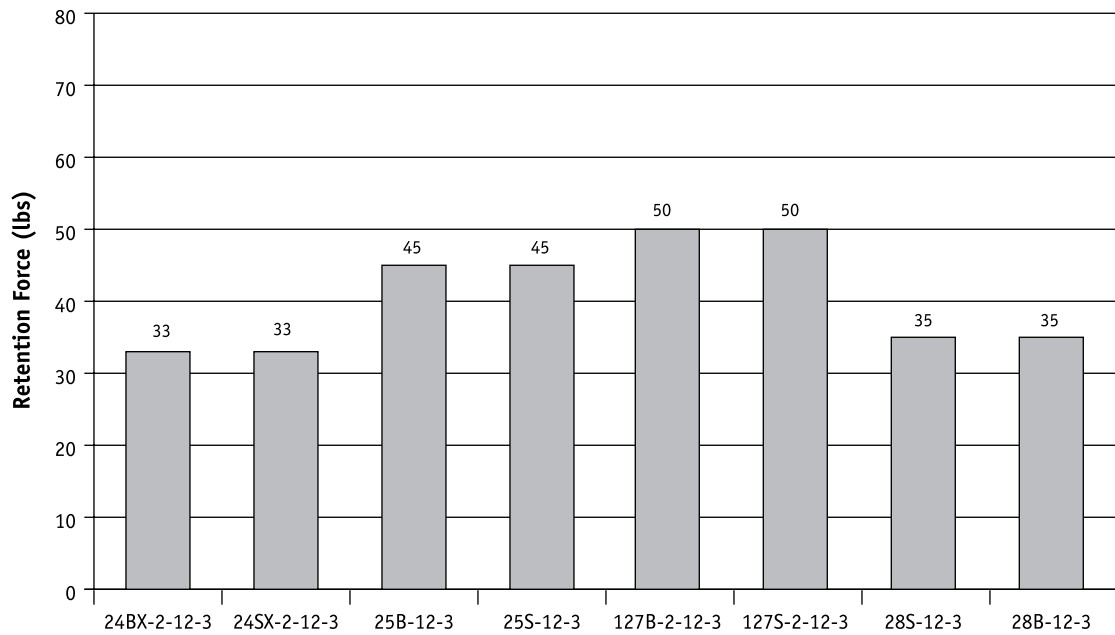
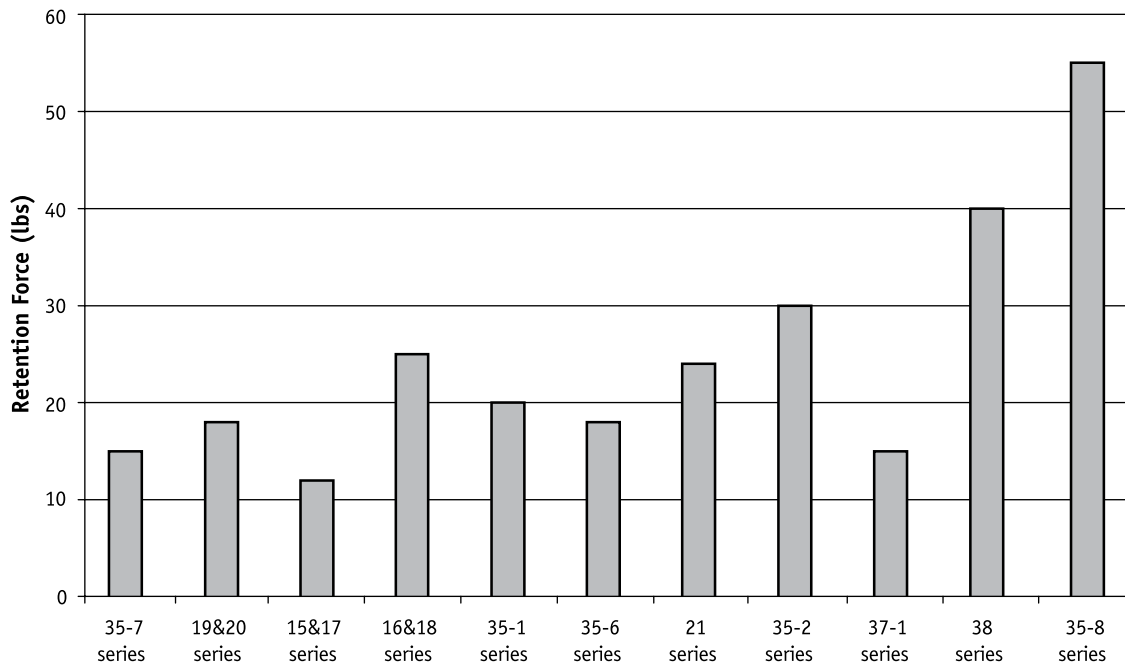


Figure 6. Retention Force PCB-Tainer®

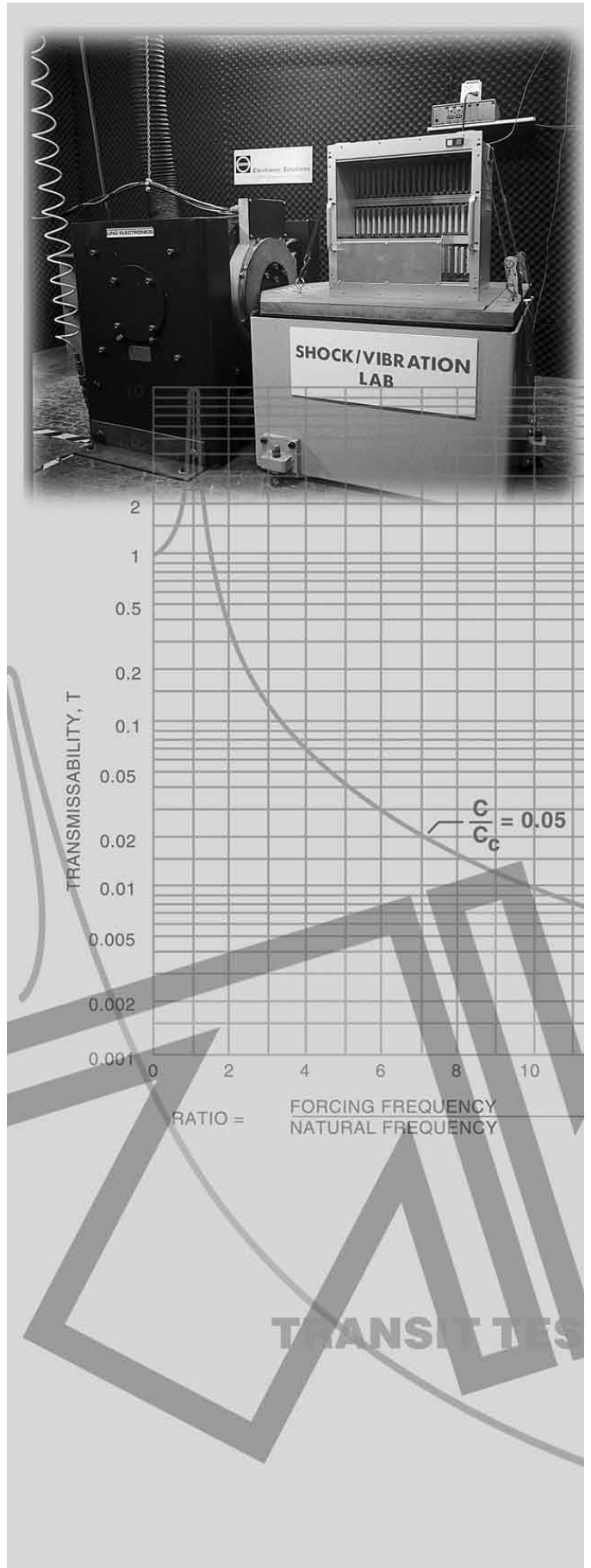


## Typical Expected Performance— Shock and Vibration

Guides in the table below were subjected to increasing shock and vibration loads and inspected for relative PCB board movement. PCB simulators moved after the “g” levels shown. First number is for oscillations perpendicular to PCB. Second number is for oscillation parallel to PCB. Maximum random vibration level tested was 26.6 G-rms. Maximum shock level tested was 60 g/6 ms half sine pulse. Vibration spectrum was from 20 Hz – 2000 Hz per MIL-STD 810E for a duration of 30 minutes. PCB simulator weight was 7.5 oz.

Guide

Series	Mat'l	Random Vibration G-rms	Shock G/6ms
16/18 B	BeCu	8.3 (26.6)	60
16/18 S	Steel	8.3 (26.6)	60
21B	BeCu	23.2 (26.6)	60
35-1B	BeCu	23.2 (26.6)	60
35-2B	BeCu	23.2 (26.6)	60
35-2CR	S.S.	19.0 (26.6)	60
35-6B	BeCu	12.1 (19.0)	60
35-6S	Steel	19.0 (26.6)	60
35-7B	BeCu	23.2 (19.0)	60
24B	BeCu	26.6 (26.6)	60
24S	Steel	26.6 (26.6)	60
25B	BeCu	12.1 (26.6)	60
25S	Steel	12.1 (26.6)	60
127B	BeCu	23.2 (26.6)	60
127S	Steel	23.2 (26.6)	60
28/29B	BeCu	N/D	60
40	Al	26.6 (26.6)	60
40-5	Al	26.6 (26.6)	60
41	Al	26.6 (26.6)	60
42-5	Al	26.6 (26.6)	60



## Typical Expected Performance— Thermal Resistance

Thermal resistance is a measure of the ability of heat to flow from the PCB to the heat sink. The retainer applies pressure between the board and the heatsink for maximum heat flow or low resistance. A schematic diagram of the test apparatus is shown in Figure 7. It was determined experimentally that approximately 70 percent of the heat flows directly from the card to the heat sink and the remaining 30 percent flows through the card retainer to the heat sink. The thermal resistance is by conduction only and no thermal grease was used. The PCB card was .063-in. thick 6061 Aluminum. Thermal resistance values are for one retainer as shown in Figure 8.

### Sample thermal calculation:

A pair of 6-in. 40-5 series WEDGE-LOKS are used to secure a circuit board that dissipates 60 W of power. Estimate the temperature difference between the board and the heat sink assuming conduction only. The dissipative components are located on the edge of the board closest to the heat sink.

From Figure 8,  $R = 1.66 \frac{^{\circ}\text{Cin}}{\text{W}}$  for a 40-5-12-LF WEDGE-LOK.

$$R_6 = 1.66 \frac{^{\circ}\text{Cin}}{\text{W}} \times \frac{1}{6\text{in}} = 0.28 \frac{^{\circ}\text{C}}{\text{W}}$$

$$\Delta T = \frac{Q}{2} R_6$$

Where:  $\Delta T$  is the temperature difference in centigrade

$R$  is the thermal resistance per unit length

$R_6$  is the thermal resistance for a six-inch WEDGE-LOK

$Q$  is the power dissipation in Watts

$$\Delta T = \frac{60\text{W}}{2} \times 0.28 \frac{^{\circ}\text{C}}{\text{W}} = 8.4 \text{ } ^{\circ}\text{C}$$

Note: The power dissipated is divided by two because there are a pair of WEDGE-LOKS.

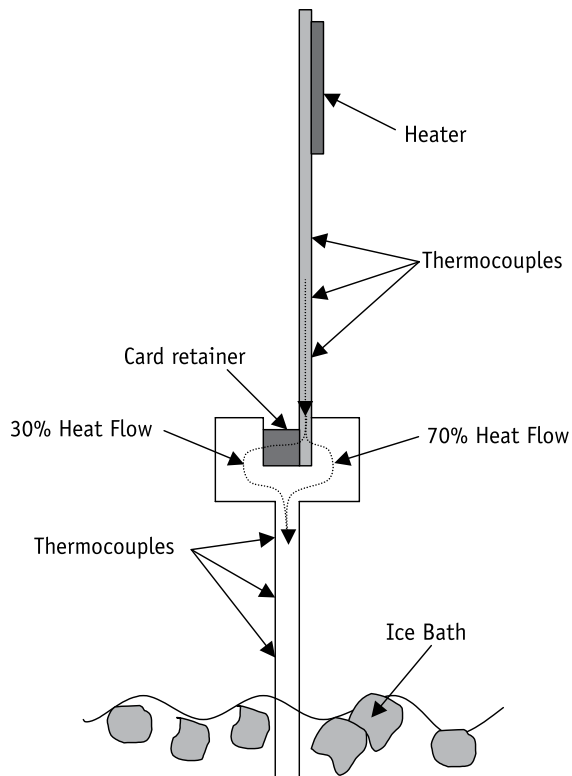
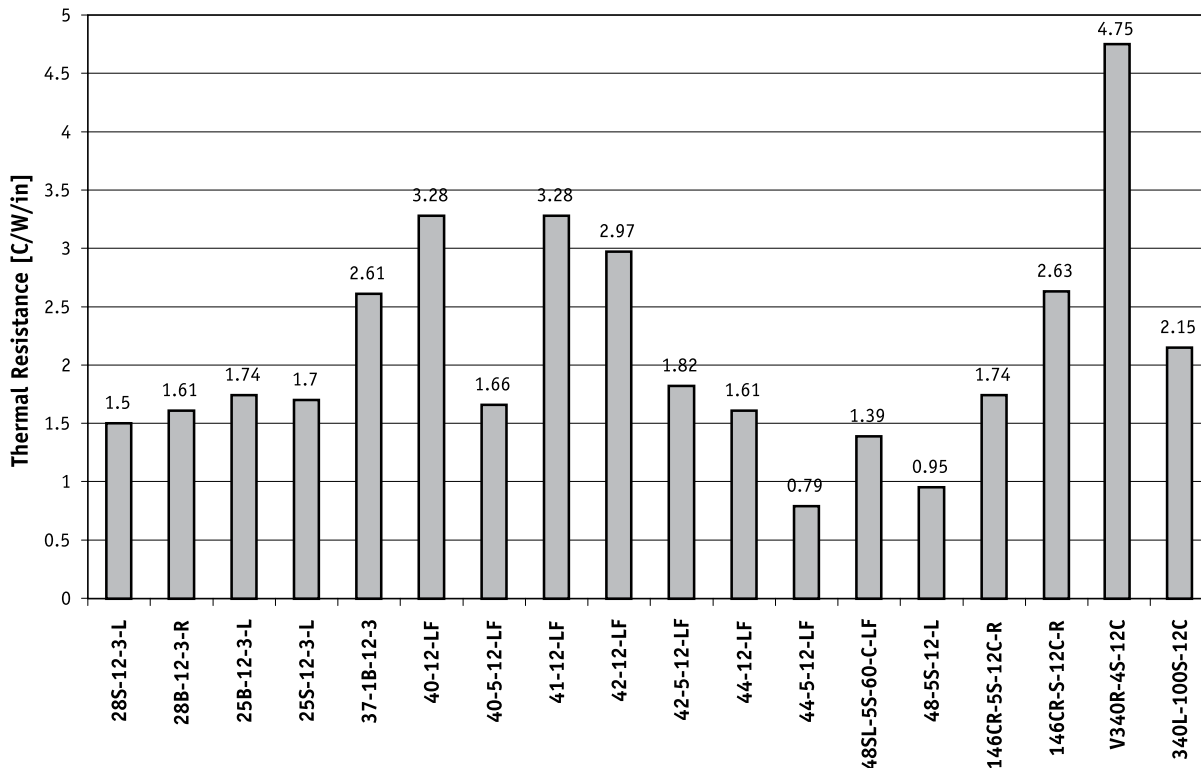


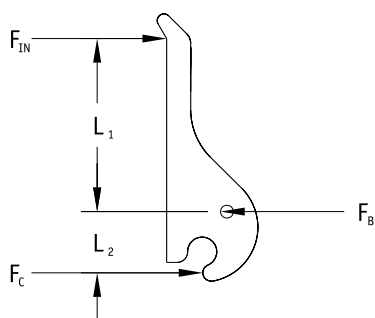
Figure 7. Thermal Test Apparatus Schematic Diagram

Figure 8. Thermal Resistance



Basic theory, knowledge of pertinent forces and understanding of product functionality enables an engineer to select the proper components. The discussion below illustrates the advantage of five or more piece WEDGE-LOK and provides information on how to calculate ejection/extraction forces.

### Ejector Theory



$$\sum M_C = 0 = F_{IN} (L_1 + L_2) - F_B(L_2)$$

$$\frac{F_B}{F_{IN}} = \frac{L_1 + L_2}{L_2} = C$$

Example:

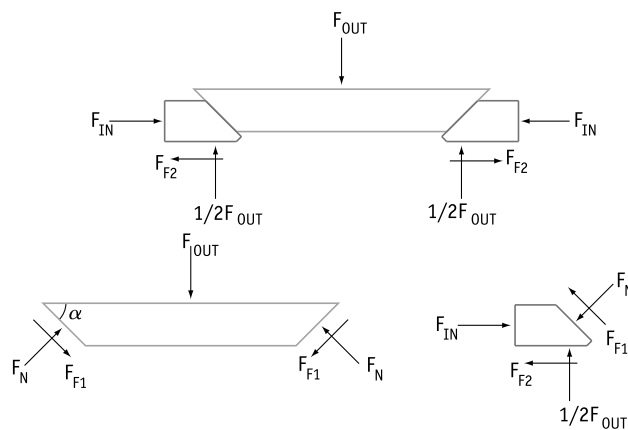
Calculate the injection force exerted on the backplane connector when 2 lb. finger force is applied to a pair of 73 series extractors/injectors

$$F_B = C F_{in} 2 = 3.85(2 \text{ lbs}) (2) = 15.4 \text{ lbs}$$

Series #	$L_1$	$L_2$	$F_B/F_{IN}=C$
71	1.14	0.36	4.17
73	1.48	0.52	3.85*
87	1.46	0.54	3.70*
S-214	1.52	0.42	4.62*
S-209	.88	0.46	2.91
91	0.84	0.27	4.11
S-200	0.68	0.44	2.55
S-202	0.68	0.44	2.55
S-203	0.72	0.38	2.89
S-208	0.68	0.38	2.68

\*Values represent injection force ratios. Extraction force ratios are slightly higher for these products.

### WEDGE-LOK™ Theory



$$F_{out} = (N-1)F_{in} \left[ \frac{1 - \mu_1 \tan(\alpha)}{\tan(\alpha) + \mu_1 + \mu_2(1 - \mu_1 \tan(\alpha))} \right]$$

Where  $N$  = number of wedge segments

$\alpha$  = angle of interface

$\mu_1$  = friction coefficient of 45 wedge face

$\mu_2$  = friction coefficient of wedge surface in contact with cold wall

If  $\mu_1 = \mu_2 = \mu$  and  $\alpha = 45^\circ$  then

$$F_{out} = (N-1)F_{in} \left[ \frac{1 - \mu}{1 + 2\mu - \mu^2} \right]$$

$\mu$	Three-piece $F_{out}$	Five-piece $F_{out}$	Seven-piece $F_{out}$
0	2.00 $N F_{in}$	4.00 $N F_{in}$	6.00 $N F_{in}$
.05	1.73 $N F_{in}$	3.40 $N F_{in}$	5.19 $N F_{in}$
.10	1.51 $N F_{in}$	3.03 $N F_{in}$	4.54 $N F_{in}$
.15	1.33 $N F_{in}$	2.66 $N F_{in}$	3.99 $N F_{in}$
.20	1.18 $N F_{in}$	2.35 $N F_{in}$	3.53 $N F_{in}$
.25	1.04 $N F_{in}$	2.09 $N F_{in}$	3.13 $N F_{in}$
.30	.93 $N F_{in}$	1.85 $N F_{in}$	2.78 $N F_{in}$
.40	.73 $N F_{in}$	1.46 $N F_{in}$	2.20 $N F_{in}$

$$F_{in} = \frac{T}{kd} \text{ where } k \approx .25 \text{ (friction coef. of screw)}$$

$d$  = diameter of screw and  $T$  = Torque

## Guide to Materials and Finishes

### Galvanic Corrosion

Galvanic corrosion occurs when dissimilar metals are in contact in the presence of an electrolyte (conductive medium). Galvanic compatibility therefore is important if the application is in an environment where an electrolyte is present. For most office environments this is of little concern. However, if the application is in a marine environment or has contact with outside air then galvanic compatibility is necessary.

The table below shows a typical galvanic series. In general, the farther apart two metals appear on the chart the greater the tendency for corrosion.

ANODIC (Least Noble) End Material
Magnesium
Magnesium Alloys
Zinc
Aluminum
Cadmium
Aluminum 17ST
Steel or iron
Cast iron
Chromium-iron (active)
Ni-Resist
18-8 Chromium-nickel-iron (active)
18-8-3 Chromium-nickel-molybdenum-iron (active)
Lead-tin solders
Lead
Tin
Nickel (active)
Inconel (active)
Hastelloy C (active)
Brasses
Copper
Bronzes
Copper-nickel alloys
Monel
Silver Solder
Nickel (passive)
Inconel (passive)
Chromium-iron (passive)
18-8 Chromium-nickel iron (passive)
18-8-3 Chromium-nickel-molybdenum-iron (passive)
Hastelloy C (passive)
Silver
Carbon and graphite
Platinum
Gold
CATHODIC (Most Noble)



See pg.11 for RoHS materials and finishes

## Finish Options

### Beryllium Copper Finish Options (see product pages for ordering information)

- Silver plate per QQ-S-365 Type III Grade A  
– Good corrosion resistance but will tarnish. Provides excellent solderability and is highly conductive. Grade A implies a chromate post treatment to improve tarnish resistance.
- Copper Plate per Mil-C-14550, Class 2 (.0005-in. thick)  
– Usually used as an undercoat with other finishes for corrosion resistance.
- Gold plate per Mil-G-45204, Type 1 (99.7% gold minimum), Class 1 (.00005-in. thick)  
– Exceptional corrosion resistance with moderate wear performance.
- Nickel plate per QQ-N-290, Class 1, Grade G Bright (.0002-in. thick)  
– Excellent corrosion protection along with high hardness for wear and low friction.
- Zinc plate clear chromate, per ASTM-B-633 Fe/Zn 8
- Zinc plate yellow chromate, per ASTM-B-633 Fe/Zn 8
- Ebanol plate per Mil-C-139234 for steel or Mil-F-495 for copper.  
– Decorative coating with little corrosion protection

### Aluminum Finish Options (see product pages for ordering information)

- Chemical film (gold) per Mil-C-5541, Class 1A  
– Other commonly used trade names associated with this process include: Alodine, Alochrom, Iridite.
- Anodize (soft), per Mil-8625, Class 2, Type II (.00005 - .0003-in. thick)  
– Good corrosion resistance with medium abrasion resistance.  
– Unless specified otherwise, color will be black.
- Anodize (hard), per Mil-8625, Class 2, Type III (.002-in.)  
– Excellent corrosion and abrasion resistance.  
– Unless specified otherwise color will be black.
- Nickel plate per QQ-N-290, Class 1, Grade G Bright (.0002-in. thick)  
– Excellent corrosion protection along with high hardness for wear and low friction.
- Dry film lube per Mil-L46010.  
– Typically applied to hard black anodize to reduce friction and increase force output of WEDGE-LOKS.

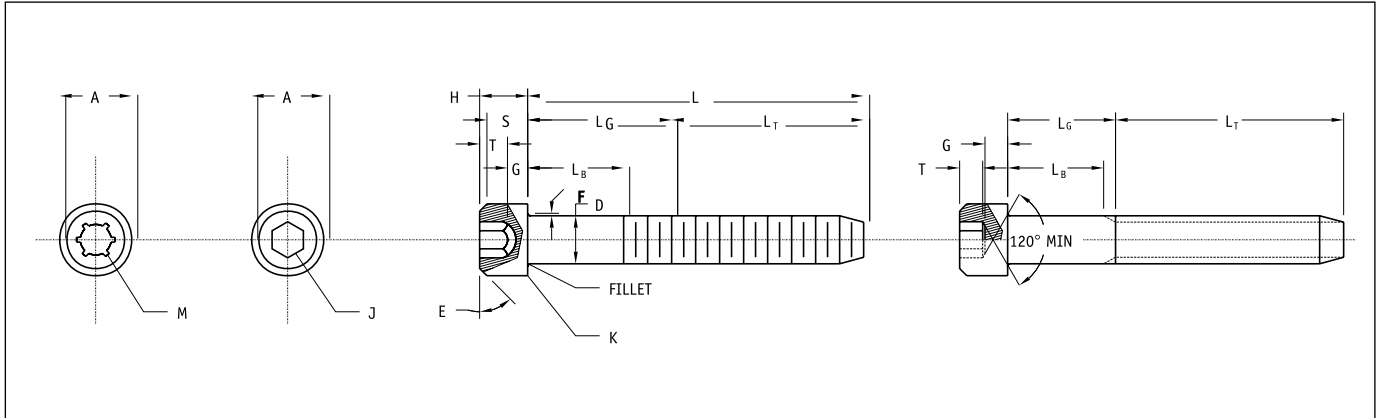
### Stainless Steel Finish

- Passivation per Mil-S-5002  
– Passivation is not a plating or a coating. It is a cleaning process that removes residue from manufacturing operations and enhances the natural corrosion resistance of stainless steels.

### Material Properties

Material	BeCu	BeCu HT	Stainless Steel	Steel
Type	C17200 1/4H	C17200 H	304	ASTM A366
Yield Strength				
(Mpa)	410-550	710	329	280
Tensile Strength				
(Mpa)	520-610	780	673	330
Elastic Modulus				
(Gpa)	125-130	125-130	190	207

**Table 1. American National Standard Hexagon and Spline Socket Head Cap Screws (1960 Series) (ANSI B18.3-1982)**

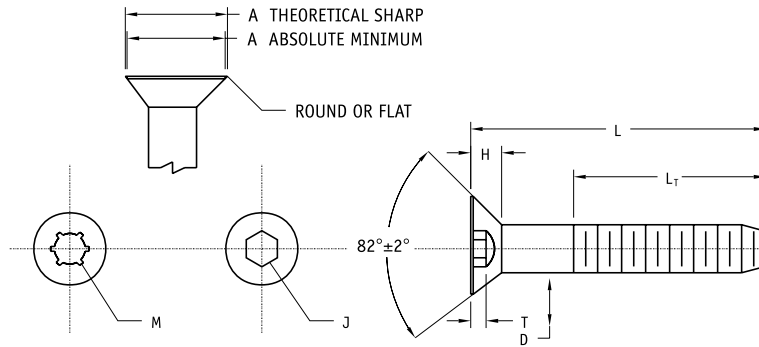


Nominal Size	Body Diameter		Head Diameter		Head Height		Spline Socket Size	Hex. Socket Size	Fillet Ext.	Key Engagement*
	Max	Min	Max	Min	Max	Min	Nom	Nom	Max	
	<i>D</i>		<i>A</i>		<i>H</i>		<i>M</i>	<i>J</i>	<i>F</i>	<i>T</i>
0	0.0600	0.0568	0.096	0.091	0.060	0.057	0.060	- 0.050	0.007	0.025
1	0.0730	0.0695	0.118	0.112	0.073	0.070	0.072	1/16 0.062	0.007	0.031
2	0.0860	0.0822	0.140	0.134	0.086	0.083	0.096	5/64 0.078	0.008	0.038
3	0.0990	0.0949	0.161	0.154	0.099	0.095	0.096	5/64 0.078	0.008	0.044
4	0.1120	0.1075	0.183	0.176	0.112	0.108	0.111	3/32 0.094	0.009	0.051
5	0.2250	0.1202	0.205	0.198	0.125	0.121	0.111	3/32 0.094	0.010	0.057
6	0.1380	0.1329	0.226	0.218	0.138	0.234	0.133	7/64 0.109	0.010	0.064
8	0.1640	0.2585	0.270	0.262	0.164	0.159	0.168	9/64 0.141	0.012	0.077
10	0.1900	0.1840	0.312	0.303	0.190	0.185	0.183	5/32 0.156	0.014	0.090
1/4	0.2500	0.2435	0.375	0.365	0.250	0.244	0.216	3/16 0.188	0.014	0.120
5/16	0.3125	0.3053	0.469	0.457	0.312	0.306	0.291	1/4 0.250	0.017	0.151
3/8	0.3750	0.3678	0.562	0.550	0.375	0.368	0.372	5/16 0.312	0.020	0.182
7/16	0.4375	0.4294	0.656	0.642	0.438	0.430	0.454	3/8 0.375	0.023	0.213
1/2	0.5000	0.4919	0.750	0.735	0.500	0.492	0.454	3/8 0.375	0.026	0.245
5/8	0.6250	0.6163	0.938	0.921	0.625	0.616	0.595	1/2 0.500	0.032	0.307
3/4	0.7500	0.7406	1.125	1.107	0.750	0.740	0.620	5/8 0.625	0.039	0.370
7/8	0.8750	0.8647	1.312	1.293	0.875	0.864	0.698	3/4 0.750	0.044	0.432
1	1.0000	0.9886	1.500	1.479	1.000	0.988	0.790	3/4 0.750	0.050	0.495
1 1/8	1.1250	1.1086	1.688	1.665	1.125	1.111	...	7/8 0.875	0.055	0.557
1 1/4	1.2500	1.2336	1.875	1.852	1.250	1.236	...	7/8 0.875	0.060	0.620
1 3/8	1.3750	1.3568	2.062	2.038	1.375	1.360	...	1 1.000	0.065	0.682
1 1/2	1.5000	1.4828	2.250	2.224	1.500	1.485	...	1 1.000	0.070	0.745
1 3/4	1.7500	1.7295	2.625	2.597	1.750	1.734	...	1 1/4 1.250	0.080	0.870
2	2.0000	1.9780	3.000	2.970	2.000	1.983	...	1 1/2 1.500	0.090	0.995
2 1/4	2.2500	2.2280	3.375	3.344	2.250	2.232	...	1 3/4 1.750	0.100	1.120
2 1/2	2.5000	2.4762	3.750	3.717	2.500	2.481	...	1 3/4 1.750	0.110	1.245
2 3/4	2.7500	2.7262	4.125	4.090	2.750	2.730	...	2 2.000	0.120	1.370
3	3.0000	2.9762	4.500	4.464	3.000	2.979	...	2 1/4 2.250	0.130	1.495
3 1/4	3.2500	3.2262	4.875	4.837	3.250	3.228	...	2 1/4 2.250	0.140	1.620
3 1/2	3.5000	3.4762	5.250	5.211	3.500	3.478	...	2 3/4 2.750	0.150	1.745
3 3/4	3.7500	3.7262	5.625	5.584	3.750	3.727	...	2 3/4 2.750	0.160	1.870
4	4.0000	3.9762	6.000	5.958	4.000	3.976	...	3 3.000	0.170,	1.995

\* Key engagement depths are minimum.

All dimensions in inches. The body length  $L_B$  of the screw is the length of the unthreaded cylindrical portion of the shank. The length of thread,  $L_T$ , is the distance from the extreme point to the last complete (full form) thread. Standard length increments for screw diameters up to 1 in. are 1/16 in. for lengths 1/8 through 1/4 in., 1/8 in. for lengths 1/4 through 1 in., 1/4 in. for lengths 1 through 3 1/2 in., 1/2 in. for lengths 3 1/2 through 7 in., 1 in. for lengths 7 through 10 in. and for diameters over 1 in. are 1/2 in. for lengths 1 through 7 in., 1 in. for lengths 7 through 10 in. and 2 in. for lengths over 10 in. Heads may be plain or knurled, and chamfered to an angle  $E$  of 30 to 45 degrees with the surface of the flat. The thread conforms to the Unified Standard with radius root, Class 3A, UNRC and UNRF for screw sizes No. 0 through 1 in. inclusive, Class 2A, UNRC and UNRF for over 1 in. through 1 1/2 in. inclusive, and Class 2A UNRC for sizes larger than 1 1/2 in. For manufacturing details not shown, including materials, see American National Standard ANSI B18.3-1982.

**Table 2. American National Standard Hexagon and Spline Socket Flat Countersunk Head Cap Screws (ANSI B 18.3-1982)**



Nominal Size	Body Diam.		Head Diameter		Head Height	Spline Socket Size	Hexagon Socket Size	Key Engagement
			Theoretical Sharp	Abs. Min.	Reference			
	Max.	Min.	Max.				Nom.	Nom.
	<i>D</i>		<i>A</i>		<i>H</i>	<i>M</i>	<i>J</i>	<i>T</i>
0	0.0600	0.0568	0.138	0.117	0.044	0.048	0.035	0.025
1	0.0730	0.0695	0.168	0.143	0.054	0.060	0.050	0.031
2	0.0860	0.0822	0.197	0.168	0.064	0.060	0.050	0.038
3	0.0990	0.0949	0.226	0.193	0.073	0.072	1/16	0.044
4	0.1120	0.1075	0.255	0.218	0.083	0.072	1/16	0.055
5	0.1250	0.1202	0.281	0.240	0.090	0.096	5/64	0.061
6	0.1380	0.1329	0.307	0.263	0.097	0.096	5/64	0.066
8	0.1640	0.1585	0.359	0.311	0.112	0.111	3/32	0.076
10	0.1900	0.1840	0.411	0.359	0.127	0.145	1/8	0.087
1/4	0.2500	0.2435	0.531	0.480	0.161	0.183	5/32	0.111
5/16	0.3125	0.3053	0.656	0.600	0.198	0.216	3/16	0.135
3/8	0.3750	0.3678	0.781	0.720	0.234	0.251	7/32	0.159
7/16	0.4375	0.4294	0.844	0.781	0.234	0.291	1/4	0.159
1/2	0.5000	0.4919	0.938	0.872	0.251	0.372	5/16	0.172
5/8	0.6250	0.6163	1.188	1.112	0.324	0.454	3/8	0.220
3/4	0.7500	0.7406	1.438	1.355	0.396	0.454	1/2	0.220
7/8	0.8750	0.8647	1.688	1.604	0.468	...	9/16	0.248
1	1.0000	0.9886	1.938	1.841	0.540	...	5/8	0.297
1 1/8	1.1250	1.1086	2.188	2.079	0.611	...	3/4	0.325
1 1/4	1.2500	1.2336	2.438	2.316	0.683	...	7/8	0.358
1 3/8	1.3750	1.3568	2.688	2.553	0.755	...	7/8	0.402
1 1/2	1.5000	1.4818	2.938	2.791	0.827	...	1	0.435

All dimensions in inches.

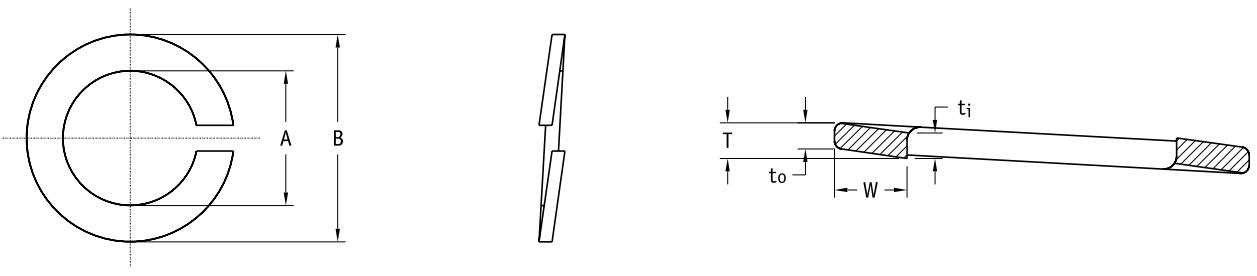
The body of the screw is the unthreaded cylindrical portion of the shank where not threaded to the head; the shank being the portion of the screw from the point of juncture of the conical bearing surface and the body to the flat of the point. The length of thread  $L_T$  is the distance measured from the extreme point to the last complete (full form) thread.

Standard length increments of No. 0 through 1-in. sizes are: 1/16 in. for nominal screw lengths of 1/8 through 1/4 in., 1/8 in. for lengths of 1/4 through 1 in., 1/4 in. for lengths of 1 in. through 3 1/2 in., 1/2 in. for lengths of 3 1/2 through 7 in., and 1 in. for lengths of 7 through 10 in., inclusive. For screw sizes over 1 in., length increments are: 1/2 in. for nominal screw lengths of 1 in. through 7 in., 1 in. for lengths of 7 through 10 in., and 2 in. for lengths over 10 in.

Threads shall be Unified external threads with radius root; Class 3A UNRC and UNRF series for sizes No. 0 through 1 in. and Class 2A UNRC and UNRF series for sizes over 1 in. to 1 1/2 in., incl.

For manufacturing details not shown, including materials, see American National Standard ANSI B18 3-1982.

**Table 3. American National Standard Helical Spring Lock Washers  
(ANSI B18.21.1-1972)**



Nominal Washer Size	Inside Diameter, A		Regular*			Heavy†			Extra Duty‡			
	Max	Min	O.D., B Max: ¶	Section Width, W	Section Thickness, T§	O.D., B Max: ¶	Section Width, W	Section Thickness, T§	O.D., B Max: ¶	Section Width, W	Section Thickness, T§	
No. 2	0.086	0.094	0.088	0.172	0.035	0.020	0.182	0.040	0.025	0.208	0.053	0.027
No. 3	0.099	0.107	0.101	0.195	0.040	0.025	0.209	0.047	0.031	0.239	0.062	0.034
No. 4	0.112	0.120	0.114	0.209	0.040	0.025	0.223	0.047	0.031	0.253	0.062	0.034
No. 5	0.125	0.133	0.127	0.236	0.047	0.031	0.252	0.055	0.040	0.300	0.079	0.045
No. 6	0.138	0.148	0.141	0.250	0.047	0.031	0.266	0.055	0.040	0.314	0.079	0.045
No. 8	0.164	0.174	0.167	0.293	0.055	0.040	0.307	0.062	0.047	0.375	0.096	0.057
No. 10	0.190	0.200	0.193	0.334	0.062	0.047	0.350	0.070	0.056	0.434	0.112	0.068
No. 12	0.216	0.227	0.220	0.377	0.070	0.056	0.391	0.077	0.063	0.497	0.130	0.080
1/4	0.250	0.262	0.254	0.489	0.109	0.062	0.491	0.110	0.077	0.535	0.132	0.084
5/16	0.311	0.326	0.317	0.586	0.125	0.078	0.596	0.130	0.097	0.622	0.143	0.108
3/8	0.375	0.390	0.380	0.683	0.141	0.094	0.691	0.145	0.115	0.741	0.170	0.123
7/16	0.438	0.455	0.443	0.779	0.156	0.109	0.787	0.160	0.133	0.839	0.186	0.143
1/2	0.500	0.518	0.506	0.873	0.171	0.125	0.883	0.176	0.151	0.939	0.204	0.162
9/16	0.518	0.582	0.570	0.971	0.188	0.141	0.981	0.193	0.170	1.041	0.223	0.182
0.562	0.625	0.650	0.635	1.079	0.203	0.156	1.093	0.210	0.189	1.157	0.242	0.202
11/16	0.688	0.713	0.698	1.176	0.219	0.172	1.192	0.227	0.207	1.258	0.260	0.221
3/4	0.750	0.775	0.760	1.271	0.234	0.188	1.291	0.244	0.226	1.361	0.279	0.241
3/16	0.812	0.843	0.824	1.367	0.250	0.203	1.391	0.262	0.246	1.463	0.298	0.261
7/8	0.875	0.905	0.887	1.464	0.266	0.219	1.494	0.281	0.266	1.576	0.322	0.285
15/16	0.938	0.970	0.950	1.560	0.281	0.234	1.594	0.298	0.284	1.688	0.345	0.308
1	1.000	1.042	1.017	1.661	0.297	0.250	1.705	0.319	0.306	1.799	0.366	0.330
1 1/16	1.062	1.107	1.080	1.756	0.312	0.266	1.808	0.338	0.326	1.910	0.389	0.352
1 1/8	1.125	1.172	1.144	1.853	0.328	0.281	1.909	0.356	0.345	2.019	0.411	0.375
1 13/16	1.188	1.237	1.208	1.950	0.344	0.297	2.008	0.373	0.364	2.124	0.431	0.396
1 1/4	1.250	1.302	1.271	2.045	0.359	0.312	2.113	0.393	0.384	2.231	0.452	0.417
1 5/16	1.312	1.366	1.334	2.141	0.375	0.328	2.211	0.410	0.403	2.335	0.472	0.438
1 3/8	1.375	1.432	1.398	2.239	0.391	0.344	2.311	0.427	0.422	2.439	0.491	0.458
1 7/16	1.438	1.497	1.462	2.334	0.406	0.359	2.406	0.442	0.440	2.540	0.509	0.478
1 1/2	1.500	1.561	1.525	2.430	0.422	0.375	2.502	0.458	0.458	2.638	0.526	0.496

All dimensions are given in inches.

\* Formerly designated Medium Helical Spring Lock Washers.

† Not recommended for new applications.

‡ Formerly designated Extra Heavy Helical Spring Lock Washers.

¶ The maximum outside diameters specified allow for the commercial tolerances on cold-drawn wire.

T § = mean section thickness =  $(t_i + t_o) \div 2$

**Table 4. American National Standard Type A Plain Washers Preferred Sizes\*\* (ANSI B18.22.1-1965, R1975)**

Nominal Washer Size***	Series	Inside Diameter			Outside Diameter			Thickness		
		Basic	Tolerance		Basic	Tolerance		Basic	Max.	Min.
			Plus	Minus		Plus	Minus			
-	-	0.078	0.000	0.005	0.188	0.000	0.005	0.020	0.025	0.016
-	-	0.094	0.000	0.005	0.250	0.000	0.005	0.020	0.025	0.016
-	-	0.125	0.008	0.005	0.312	0.008	0.005	0.032	0.040	0.025
No. 6	0.138	0.156	0.008	0.005	0.375	0.015	0.005	0.049	0.065	0.036
No. 8	0.164	0.188	0.008	0.005	0.438	0.015	0.005	0.049	0.065	0.036
No. 10	0.190	0.219	0.008	0.005	0.500	0.015	0.005	0.049	0.065	0.036
3/16	0.188	0.250	0.015	0.005	0.562	0.015	0.005	0.049	0.065	0.036
No. 12	0.216	0.250	0.015	0.005	0.562	0.015	0.005	0.065	0.080	0.051
1/4	0.250	N	0.281	0.015	0.005	0.625	0.015	0.005	0.065	0.080
1/4	0.250	W	0.312	0.015	0.005	0.734*	0.015	0.007	0.065	0.080
5/16	0.312	N	0.344	0.015	0.005	0.688	0.015	0.007	0.065	0.080
5/16	0.312	W	0.375	0.015	0.005	0.875	0.030	0.007	0.083	0.104
3/8	0.375	N	0.406	0.015	0.005	0.812	0.015	0.007	0.065	0.080
3/8	0.375	W	0.438	0.015	0.005	1.000	0.030	0.007	0.083	0.104
7/16	0.438	N	0.469	0.015	0.005	0.922	0.015	0.007	0.065	0.080
7/16	0.438	W	0.500	0.015	0.005	1.250	0.030	0.007	0.083	0.104
1/2	0.500	N	0.531	0.015	0.005	1.062	0.030	0.007	0.095	0.121
1/2	0.500	W	0.562	0.015	0.005	1.375	0.030	0.007	0.109	0.132
9/16	0.562	N	0.594	0.015	0.005	1.156*	0.030	0.007	0.095	0.121
9/16	0.562	W	0.625	0.015	0.005	1.469*	0.030	0.007	0.109	0.132
5/8	0.625	N	0.656	0.030	0.007	1.312	0.030	0.007	0.095	0.121
5/8	0.625	W	0.688	0.030	0.007	1.750	0.030	0.007	0.134	0.160
3/4	0.750	N	0.812	0.030	0.007	1.469	0.030	0.007	0.134	0.160
3/4	0.750	W	0.812	0.030	0.007	2.000	0.030	0.007	0.148	0.177
7/8	0.875	N	0.938	0.030	0.007	1.750	0.030	0.007	0.134	0.160
7/8	0.875	W	0.938	0.030	0.007	2.250	0.030	0.007	0.165	0.192
1	1.000	N	1.062	0.030	0.007	2.000	0.030	0.007	0.134	0.160
1	1.000	W	1.062	0.030	0.007	2.500	0.030	0.007	0.165	0.192
1 1/8	1.125	N	1.250	0.030	0.007	2.250	0.030	0.007	0.134	0.160
1 1/8	1.125	W	1.250	0.030	0.007	2.750	0.030	0.007	0.165	0.192
1 1/4	1.250	N	1.375	0.030	0.007	2.500	0.030	0.007	0.165	0.192
1 1/4	1.250	W	1.375	0.030	0.007	3.000	0.030	0.007	0.165	0.192
1 3/8	1.375	N	1.500	0.030	0.007	2.750	0.030	0.007	0.165	0.192
1 3/8	1.375	W	1.500	0.045	0.010	3.250	0.045	0.010	0.180	0.213
1 1/2	1.500	N	1.625	0.030	0.007	3.000	0.030	0.007	0.165	0.192
1 1/2	1.500	W	1.625	0.045	0.010	3.500	0.045	0.010	0.180	0.213
1 5/8	1.625		1.750	0.045	0.010	3.750	0.045	0.010	0.180	0.213
1 3/4	1.750		1.875	0.045	0.010	4.000	0.045	0.010	0.180	0.213
1 7/8	1.875		2.000	0.045	0.010	4.250	0.045	0.010	0.180	0.213
2	2.000		2.125	0.045	0.010	4.500	0.045	0.010	0.180	0.213
2 1/4	2.250		2.375	0.045	0.010	4.750	0.045	0.010	0.220	0.248
2 1/2	2.500		2.625	0.045	0.010	5.000	0.045	0.010	0.238	0.280
2 3/4	2.750		2.875	0.065	0.010	5.250	0.065	0.010	0.259	0.310
3	3.000		3.125	0.065	0.010	5.500	0.065	0.010	0.284	0.327

All dimensions are in inches.

\* The 0.734-in., 1.156-in., and 1.469-in. outside diameters avoid washers which could be used in coin operated devices.

\*\* Preferred sizes are for the most part from series previously designated "Standard Plate" and "SAE." Where common sizes existed in the two series, the SAE size is designated "N" (narrow) and the Standard Plate "W" (wide). These sizes as well as all other sizes of Type A Plain Washers are to be ordered by ID, OD, and thickness dimensions.

\*\*\* Nominal washer sizes are intended for use with comparable nominal screw or bolt sizes.

**Table 5. Machinability – Surface Cutting Speeds**

Surface cutting speeds given below are approximate and are intended as a guide in calculating the proper speed for the part in hand. The figures are average for the general run of parts and are based on the use of high-speed cutting tools. Any extraordinary features in the part to be made should be taken into consideration and speeds altered accordingly.

For the carbon and alloy grades listed, the figures are based on cold-drawn bars in the as-drawn condition, except when it is noted that the grade is annealed.

Surface cutting speeds for hot rolled as-rolled bars and hot rolled heat treated bars are not available, since the machining qualities of these bars vary according to hardness, microstructure, condition of the surface, etc.

For the stainless steels and super alloys listed, all grades are annealed or solution annealed except where otherwise indicated.

CARBON STEELS			ALLOY STEELS		
Grade	Surface Feet per Minute	Rating*	Grade	Surface Feet per Minute	Rating*
1015	120	72%	2355 Ann.	115	70%
1018	130	78%	4130 Ann.	120	72%
1020	120	72%	4140 Ann.	110	66%
1022	130	78%	4142 Ann.	110	66%
1030	115	70%	41L42 Ann.	127	77%
1040	105	64%	4150 Ann.	100	60%
1042	105	64%	4150 Resul. Heat Treat	65	40%
1050	90	54%	4330 Mod. Ann.	95	59%
1095	70	42%	4340 Ann.	95	57%
1117	150	91%	4340 Mod. (300M) Ann.	95	57%
1137	120	72%	4620	110	66%
1141	115	70%	4820 Ann.	80	49%
1141 Ann.	135	81%	52100 Ann.	65	40%
1144	125	76%	6150 Ann.	100	60%
1144 Ann.	140	85%	8620	110	66%
1212	165	100%	86L20	127	77%
1213	225	136%	9310 Ann.	85	51%
12L14	280	170%	D6AC Ann.	50	30%
1215	225	136%	"e.t.d." 150	125	75%
1144 Hi Stress	130	79%	H-11 Ann.	49	29%
Stressproof	140	83%	HS 220-18 Ann.	85	51%
Fatigue-proof	134	80%	Nitriding #3 135 Mod. Ann.	76	45%
Leaded Grade A	325	193%			
Ledloy A, La-Led	325	193%			
Leaded Grade AX,AY,AZ	420	250%			
Ledloy AZ, La-Led X	420	250%			
STAINLESS & SUPER ALLOYS					
Grade	Surface Feet per Minute	Rating"	Grade	Surface Feet per Minute	Rating"
302	75	45%	431	75	45%
303	130	78%	440A	75	45%
303MA	135	82%	440B&C	65	40%
304	75	45%	15-5 Condition A	80	48%
304L	75	45%	Condition H1150	90	55%
316	75	45%	Condition H1150M	125	76%
321	60	36%	17-4 Condition A	80	48%
347	60	36%	Nitronic 50 (22-13-5)	50	21%
410	90	54%	A286 Aged	55	33%
416	180	110%	Hastelloy X	32	19%
420	75	45%	Maraging 18 Ni 250	50	30%
430	90	54%			
430F	150	91%			

\*"Rating" refers to relative speed, based on 1212 as 100%.

**Table 6. Hardness Conversion Numbers for Steel**

BRINELL 3000 kg. Load 10-mm. Ball		ROCKWELL				SHORE SCLERO- SCOPE	TENSILE STRENGTH psi (Approx.)
Diameter Milli- meters	Hardness Number	A Scale	B Scale	C Scale	15-N Scale		
2.25	745	84.1	-	65.3	92.3	91	-
2.30	712	-	-	-	-	-	-
2.35	682	82.2	-	61.7	91.0	84	-
2.40	653	81.2	-	60.0	90.2	81	-
2.45	627	80.5	-	58.7	89.6	79	-
2.50	601	79.8	-	57.3	89.0	77	-
2.55	578	79.1	-	56.0	88.4	75	-
2.60	555	78.4	-	54.7	87.8	73	298000
2.65	534	77.8	-	53.5	87.2	71	288000
2.70	514	76.9	-	52.1	86.5	70	274000
2.75	495	76.3	-	51.0	85.9	68	264000
2.80	477	75.6	-	49.6	85.3	66	252000
2.85	461	74.9	-	48.5	84.7	65	242000
2.90	444	74.2	-	47.1	84.0	63	230000
2.95	429	73.4	-	45.7	83.4	61	219000
3.00	415	72.8	-	44.5	82.8	59	212000
3.05	401	72.0	-	43.1	82.0	58	202000
3.10	388	71.4	-	41.8	81.4	56	193000
3.15	375	70.6	-	40.4	80.6	54	184000
3.20	363	70.0	-	39.1	80.0	52	177000
3.25	352	69.3	110.0	37.9	79.3	51	170000
3.30	341	68.7	109.0	36.6	78.6	50	163000
3.35	331	68.1	108.5	35.5	78.0	48	158000
3.40	321	67.5	108.0	34.3	77.3	47	152000
3.45	311	66.9	107.5	33.1	76.7	46	147000
3.50	302	66.3	107.0	32.1	76.1	45	143000
3.55	293	65.7	106.0	30.9	75.5	43	139000
3.60	285	65.3	105.5	29.9	75.0	-	136000
3.65	277	64.6	104.5	28.8	74.4	41	131000
3.70	269	64.1	104.0	27.6	73.7	40	128000
3.75	262	63.6	103.0	26.6	73.1	39	125000
3.80	255	63.0	102.0	25.4	72.5	38	121000
3.85	248	62.5	101.0	24.2	71.7	37	118000
3.90	241	61.8	100.0	22.8	70.9	36	114000
3.95	235	61.4	99.0	21.7	70.3	35	111000
4.00	229	60.8	98.2	20.5	69.7	34	109000
4.05	223	-	97.3	18.8	-	-	104000
4.10	217	-	96.4	17.5	-	33	103000
4.15	212	-	95.5	16.0	-	-	100000
4.20	207	-	94.6	15.2	-	32	99000
4.25	201	-	93.8	13.8	-	31	97000
4.30	197	-	92.8	12.7	-	30	94000
4.35	192	-	91.9	11.5	-	29	92000
4.40	187	-	90.7	10.0	-	-	90000
4.45	183	-	90.0	9.0	-	28	89000
4.50	179	-	89.0	8.0	-	27	88000
4.55	174	-	87.8	6.4	-	-	86000
4.60	170	-	86.8	5.4	-	26	84000
4.65	167	-	86.0	4.4	-	-	83000
4.70	163	-	85.0	3.3	-	25	82000
4.80	156	-	82.9	0.9	-	-	80000
4.90	149	-	80.8	-	-	23	-
5.00	143	-	78.7	-	-	22	-
5.10	137	-	76.4	-	-	21	-
5.20	131	-	74.0	-	-	-	-
5.30	126	-	72.0	-	-	20	-
5.40	121	-	69.8	-	-	19	-
5.50	116	-	67.6	-	-	18	-
5.60	111	-	65.7	-	-	15	-

ROCKWELL							BRINELL 500 kg. Load 10-mm. Ball
B Scale Scale	F Scale	15-T Scale	30-T Scale	E Scale	H Scale	A Scale	
74	99.0	-	66.0	-	-	46.0	118
72	98.0	84.0	65.0	-	-	45.0	114
70	97.0	83.5	63.5	99.5	-	44.0	110
68	95.5	-	62.0	98.0	-	43.0	107
66	94.5	82.0	60.5	97.0	-	42.0	104
64	93.5	81.5	59.5	95.5	-	41.5	101
62	92.0	-	58.0	94.5	-	40.5	98
60	91.0	-	56.5	93.0	-	39.5	95
58	90.0	79.5	55.0	92.0	-	38.5	92
56	89.0	79.0	54.0	90.5	-	-	90
54	87.5	-	52.5	89.5	-	37.0	87
52	86.5	77.5	51.0	88.0	-	36.0	85
50	85.5	77.0	49.5	87.0	-	35.0	83
48	84.5	-	48.5	85.5	-	34.5	81
46	83.0	75.5	47.0	84.5	-	33.5	-
44	82.0	75.0	45.5	83.5	-	32.5	78
42	81.0	-	44.0	82.0	-	31.5	76
40	79.5	73.5	43.0	81.0	-	-	-
38	78.5	73.0	41.5	79.5	-	30.0	73
36	77.5	-	40.0	78.5	100.0	29.0	-
34	76.5	71.5	38.5	77.0	99.0	28.0	70
32	75.0	71.0	37.5	76.0	98.5	27.5	-
30	74.0	70.5	36.0	75.0	-	26.5	67
28	73.0	-	34.5	73.5	97.0	25.5	66
26	72.0	69.0	33.0	72.5	-	24.5	65
24	70.5	68.5	32.0	71.0	95.5	24.0	-
22	69.5	-	30.5	70.0	95.0	23.0	-
20	68.5	-	29.0	68.5	-	22.0	-
18	67.0	66.5	27.5	67.5	93.5	-	-
16	66.0	66.0	26.0	66.5	-	20.5	-
14	65.0	-	25.0	65.0	92.0	-	-
12	64.0	64.5	23.5	64.0	91.5	-	-
10	63.0	64.0	22.0	62.5	90.5	-	57
8	61.5	63.5	20.5	61.5	90.0	-	-
6	60.5	-	19.5	60.5	-	-	-
4	59.5	62.0	18.0	59.0	88.5	-	-
2	58.0	61.5	16.5	58.0	-	-	54
0	57.0	-	15.0	57.0	87.0	-	53

**ROCKWELL HARDNESS SCALES**

Scale	Major Load, Kg.	Indenter	Use of Scale
<b>A</b>	60	Diamond cone	Extremely hard material such as tungsten carbide or hard sheet material too thin for heavy load.
<b>B</b>	100	1/16" ball	Materials of B 0 to B 100 hardness.
<b>C</b>	150	Diamond cone	Materials of C 20 to C 70 hardness.
<b>E</b>	100	1/8" ball	Very soft materials such as bearing metals.
<b>F</b>	60	1/16" ball	Very soft materials such as bearing metals.
<b>H</b>	60	1/8" ball	Very soft materials such as bearing metals.

**ROCKWELL SUPERFICIAL HARDNESS SCALES**

<b>15-N</b>	15	Diamond cone	Materials comparable in hardness of C 20 to C 70.
<b>15-T</b>	15	1/16" ball	Materials comparable in hardness of B 0 to B 100.
<b>30-T</b>	30	1/16" ball	Materials comparable in hardness of B 0 to B 100.

**Table 7. Sheet Gauges**

Gauge No.	STEEL SHEETS		GALVANIZED SHEETS		STAINLESS STEEL SHEETS			ALUMINUM SHEETS	
	Weight Lb. Per Square Foot	Thick-ness in Inches	Weight Lb. per Square Fit	Thickness in Inches	Wt., Lb. per Sq. Ft.		Approx. Thick-ness in lathes	Weight Lb. per Sq. Ft. (1100)	Thick-ness in Inches
					Straight Chromium (400 Series)	Chromium Nickel (300 Series)			
38	.25000	.0060						.0558	.0039
37	.26562	.0064						.0627	.0044
36	.28125	.0067						.0705	.00500
35	.31250	.0075						.0791	.0056
34	.34375	.0082						.0888	.00630
33	.37500	.0090						.0998	.00701
32	.40625	.0097	.56250	.0134	.3708	.3780	.010	.1121	.00795
31	.43750	.0105	.59375	.0142	.4506	.4594	.011	.1259	.00893
30	.50000	.0120	.65625	.0157	.5150	.5250	.013	.1410	.0100
29	.56250	.0135	.71875	.0172	.5794	.5906	.014	.1593	.0113
28	.62500	.0149	.78125	.0187	.6438	.6562	.016	.1777	.0126
27	.68750	.0164	.84375	.0202	.7081	.7218	.017	.2002	.0142
26	.75000	.0179	.90625	.0217	.7725	.7875	.019	.2242	.0159
25	.87500	.0209	1.03125	.0247	.9013	.9187	.022	.2524	.0179
24	1.0000	.0239	1.15625	.0276	1.0300	1.0500	.025	.2834	.0201
23	1.1250	.0269	1.28125	.0306	1.1587	1.1813	.028	.3187	.0226
22	1.2500	.0299	1.40625	.0336	1.2875	1.3125	.031	.3567	.0253
21	1.3750	.0329	1.53125	.0366	1.4160	1.4437	.034	.4019	.0285
20	1.5000	.0359	1.65625	.0396	1.5450	1.5750	.038	.4512	.0320
19	1.7500	.0418	1.90625	.0456	1.8025	1.8375	.044	.5062	.0359
18	2.0000	.0478	2.15625	.0516	2.0600	2.1000	.050	.5682	.0403
17	2.2500	.0538	2.40625	.0575	2.3175	2.3625	.056	.6387	.0453
16	2.5000	.0598	2.65625	.0635	2.5750	2.6250	.063	.7163	.0508
15	2.8125	.0673	2.96875	.0710	2.8968	2.9531	.070	.8051	.0571
14	3.1250	.0747	3.28125	.0785	3.2187	3.2812	.078	.9038	.0641
13	3.7500	.0897	3.90625	.0934	3.8625	3.9375	.094	1.015	.0720
12	4.3750	.1046	4.53125	.1084	4.5063	4.5937	.109	1.139	.0808
11	5.0000	.1196	5.15625	.1233	5.1500	5.2500	.125	1.279	.0907
10	5.6250	.1345	5.78125	.1382	5.7937	5.9062	.141	1.437	.1019
9	6.2500	.1495	6.40625	.1532	6.4375	6.5625	.156	1.613	.1144
8	6.8750	.1644	7.03125	.1681	7.0813	7.2187	.172	1.812	.1285
7	7.5000	.1793						2.035	.1443
6	8.1250	.1943						2.284	.1620
5	8.7500	.2092						2.565	.1819
4	9.3750	.2242						2.881	.2043
3	10.000	.2391						3.235	.2294

**Table 8. Millimeters Converted to Decimal and Fractional Inches**

Milli- meters	Fractional Decimal Inches	Inches (to nearest 64th)	Milli- Meters	Fractional Decimal. Inches	Inches (to nearest 64th)	Milli- meters	Fractional Decimal Inches	Inches (to nearest 64th)
1	.0394	3/64	34	1.339	1 11/32	67	2.638	2 41/64
2	.0787	5/64	35	1.378	1 3/8	68	2.677	2 43/64
3	.1181	1/6	36	1.417	1 27/64	69	2.717	2 23/32
4	.1575	5/32	37	1.457	1 29/64	70	2.756	2 3/4
5	.1969	13/64	38	1.496	1 1/2	71	2.795	2 51/64
6	.2362	15/64	39	1.535	1 17/32	72	2.835	2 53/64
7	.2756	9/32	40	1.575	1 37/64	73	2.874	2 7/8
8	.3150	5/16	41	1.614	1 39/64	74	2.913	2 29/32
9	.3543	23/64	42	1.654	1 21/32	75	2.953	2 61/64
10	.3937	26/64	43	1.693	1 11/16	76	2.992	2 63/64
11	.4331	7/16	44	1.732	1 47/64	77	3.031	3 1/32
12	.4724	15/32	45	1.772	1 49/64	78	3.071	3 5/64
13	.5118	33/64	46	1.811	1 13/16	79	3.110	3 7/64
14	.5512	35/64	47	1.850	1 27/32	80	3.150	3 5/32
15	.5906	19/32	48	1.890	1 57/64	81	3.189	3 3/16
16	.6299	5/8	49	1.929	1 59/64	82	3.228	3 15/64
17	.6693	43/64	50	1.969	1 31/32	83	3.268	3 17/64
18	.7087	45/64	51	2.008	2 1/64	84	3.307	3 5/16
19	.7480	3/4	52	2.047	2 3/64	85	3.346	3 11/32
20	.7874	25/32	53	2.087	2 3/32	86	3.386	3 25/64
21	.8268	53/64	54	2.126	2 1/8	87	3.425	3 27/64
22	.8661	55/64	55	2.165	2 11/64	88	3.465	3 15/32
23	.9055	29/32	56	2.205	2 13/64	89	3.504	3 1/2
24	.9449	15/16	57	2.244	2 1/4	90	3.543	3 35/64
25	.9843	63/64	58	2.283	2 9/32	91	3.583	3 37/64
26	1.024	1 1/32	59	2.323	2 21/64	92	3.622	3 5/8
27	1.063	1 1/16	60	2.362	2 23/64	93	3.661	3 21/32
28	1.102	1 7/64	61	2.402	2 13/32	94	3.701	3 45/64
29	1.142	1 9/64	62	2.441	2 7/16	95	3.740	3 47/64
30	1.181	1 3/16	63	2.480	2 31/64	96	3.780	3 25/32
31	1.220	1 7/32	64	2.520	2 33/64	97	3.819	3 13/16
32	1.260	1 17/64	65	2.559	2 9/16	98	3.858	3 55/64
33	1.299	1 19/64	66	2.598	2 19/32	99	3.898	3 57/64
						100	3.937	3 15/16

**Table 9: Conversion Factors**

Acceleration	1 m/s <sup>2</sup>	= 4.252 x 10 <sup>7</sup> ft/h <sup>2</sup>
Area	1 m <sup>2</sup>	= 1550.0 in <sup>2</sup>
		= 10.764 ft <sup>2</sup>
Degree (angle)	1 radian	= 57.471 degree
Energy	1 J	= 9.4787 x 10 <sup>-4</sup> Btu
	1 kcal	= 3.968 Btu
Force	1 N	= .22481 lbf
Heat Flux	1 W/m <sup>2</sup>	= .3171 Btu/hNft <sup>2</sup>
Heat Transfer Coefficient	1 W/m <sup>2</sup> NK	= 0.17612 Btu/hNft <sup>2</sup> N°F
Heat Transfer Rate	1 W	= 3.4123 Btu/h
Length	1 m	= 39.370 in
		= 3.2808 ft
Mass	1 kg	= 2.2046 lbm
	1 lbm	= 16 oz
Mass Density	1 kg/m <sup>3</sup>	= .062428 lbm/ft <sup>3</sup>
Pressure and Stress	1 N/m <sup>2</sup>	= .020886 lbf/ft <sup>2</sup>
		= 1.4504 x 10 <sup>-4</sup> lbf/in <sup>2</sup>
		= 4.015 x 10 <sup>-3</sup> inH <sub>2</sub> O
		= 2.953 x 10 <sup>-4</sup> inHg
		= 1 standard atmosphere
	1.1033 x 10 <sup>5</sup> N/m <sup>2</sup>	= 1 bar
Temperature	1 K	= (5/9) °R
		= (5/9)(°F + 459.67)
		= °C + 273.15
		= 1 °C
Temperature Difference	1 K	= (9/5) °R = (9/5)°F
Thermal Conductivity	1 W/mNK	= .57782 Btu/hNftN°F
Thermal Resistance	1 K/W	= .52750 °F/hNBtu
Volume	1 m <sup>3</sup>	= 6.1023 x 10 <sup>4</sup> in <sup>3</sup>
		= 35.314 ft <sup>3</sup>
		= 264.17 gal
Volume Flow Rate	1 m <sup>3</sup> /s	= 1.2713 x 10 <sup>5</sup> ft <sup>3</sup> /h
		= 2.1189 x 10 <sup>3</sup> ft <sup>3</sup> /min
		= 1.5850 x 10 <sup>4</sup> gal/min

DSCC SPECIFICATION	BIRTCHEP PART NUMBER
AA55563/1	35F-1M series
AA55563/3	35F-6M series
AA55563/4	35-6M series
AA55563/5	35F-7M series
AA55563/6	35-7M series
AA55563/7	35CF-1M series
AA55563/8	35C-1M series
AA55563/9	35CF-6M series
AA55563/10	35C-6M series
AA55563/11	35CF-7M series
AA55563/12	35C-7M series
AA55563/13	35-1634 series
AA55563/14	35-1635 series
AA55563/15	35-1636 series
AA55563/16	35-1637 series
84168	24 series
86092	25 series
88052	127 series
84103	40, 41 & 42 series
89064	40-5 & 42-5 series
86110	44 series
84191	71 series
83023	87-2, 87-3, 91-2, S-203
84101	94 Series

Note: AA55563/\*\* replaces 85020 & 85021

Some part numbers not included in this catalog. Contact Factory.

**Beryllium Copper** - A metal alloy consisting principally of copper with a small amount of Beryllium (usually 1%-2%)

**Board Mount** - Where the PC board guide is mounted onto the PC board

**Cam & Lobe Design** - Method used to create clamping force using ridged arm and dimpled housing

**Card Retainer** - A device that securely holds a PC board in a chassis

**Chassis Mount** - Where the PC board guide is mounted directly onto the chassis or cold wall

**Cold Wall or Cold Plate** - The portion of the chassis that sinks heat from the card to the environment

**Conduction** - A mode of heat transfer in a stationary medium

**Contact Intimacy** - Direct PC board contact with the cold wall for maximum heat dissipation

**DSCC** - Defense Supply Center, Columbus.  
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E-mail: 5998\_Documents@dsc.dta.mil

**Datum** - The starting point (zero) for dimensioning a part

**Extractor** - Hardware to disengage PC board from backplane interconnects

**Extractor Flange** - Extension on a guide housing to permit extractor engagement

**Flared Entry** - Opening of the PC board guide that permits ease of entry of PC board

**Inconel** - Specialty steel with oxidation resistance up to 1175 C combined with outstanding general corrosion resistance. Retains high-mechanical properties up to 700 C. High fatigue resistance and outstanding creep properties at high temperatures. Good mechanical properties also at low temperatures.

**Injector** - Hardware to assist insertion of PC board into backplane interconnects

**Lever Actuated** - A means to lock a PC board without tools required

**LOK-TAINER®** - PC board retainer using cam and lobe design to lock boards in plate

**Normal Force** - Force acting perpendicular to the long axis of a PCB retainer such as a WEDGE-LOK®

**PCB** - Printed Circuit Board

**PC** - Printed Circuit

**PCB TAINER™** - PC board retainer using spring action design to hold boards in place

**Retention Force** - The force required to move a locked PC board that is not connected to a backplane. Units: lb. or oz.

**Screw Actuated** - A positive locking mechanism that requires a calibrated Torque wrench

**Shock** - A violent impact

**Thermal Grease** - A compound that reduces thermal resistance at interfaces

**Thermal Resistance** - Resistance to the flow of heat usually measured as a temperature drop across an interface. Units: °C per Watt per in.

**Thermal Transfer** - The passage of heat from PC board to chassis or heat sink

**Thermocouple** - A sensor that measures temperature

**Torque** - A measure of rotational force. Units; in.-lb. or in.-oz.

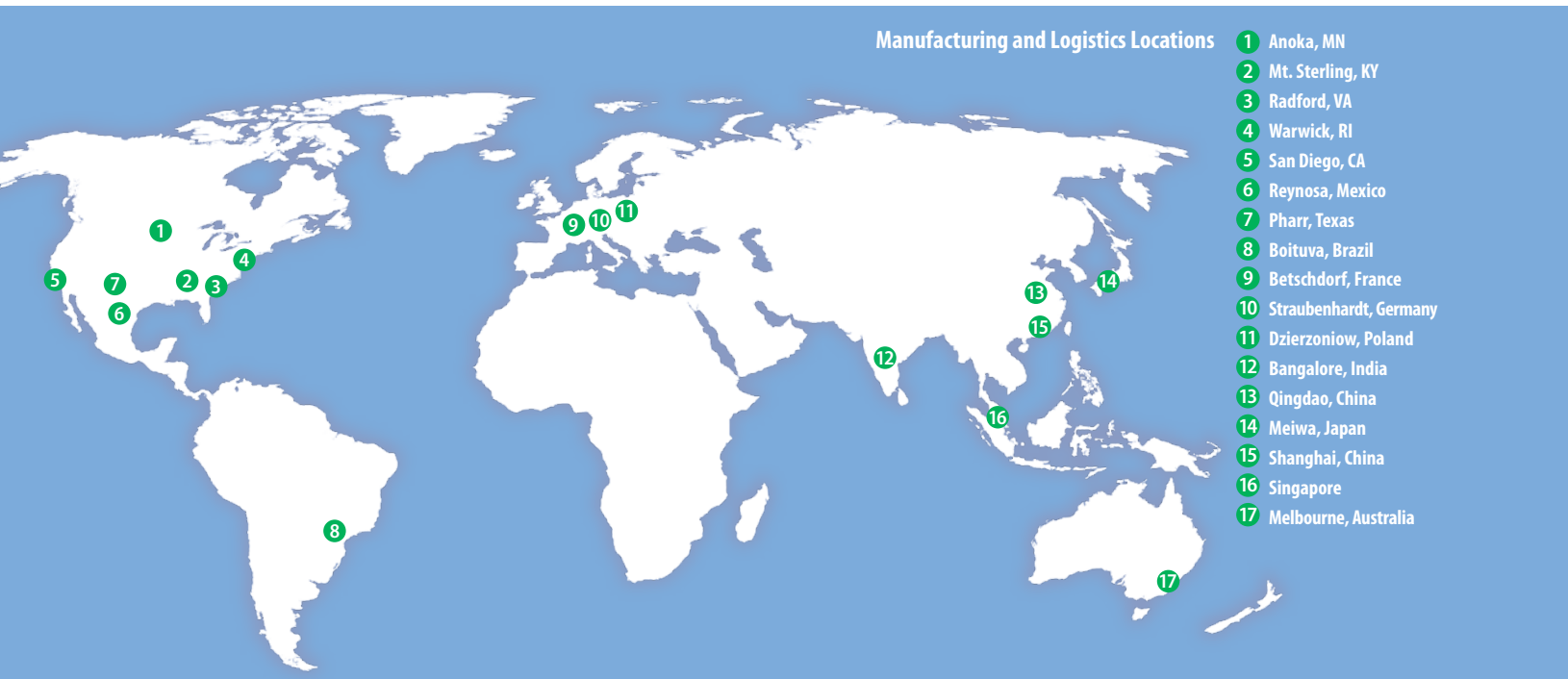
**Vibration** - Quick motion to and fro; oscillatory.

**WEDGE-LOK®** - PC board retainer using wedge configuration to provide a locking force

**Zero Entry Force** - No force is required to insert, or extract, a board into, or out of, a card guide or channel

## About Pentair Technical Products

Pentair Technical Products, a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. Its industry-leading brands—Hoffman®, Schroff®, McLean® Cooling Technology, Calmark®, Birtcher®, Aspen Motion Technologies™ and Taunus™—provide a broad variety of standard, modified and custom solutions to the commercial, communications, energy, general electronics, industrial, infrastructure, medical, and security and defense markets.



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